COMMONPLACE-BOOK.

7531. In English, on paper: written in 3 hands in the 18th cent.: 8¼ × 6¼ in., 138 leaves.

Notes on natural science, extracted from various works published before 1740; arranged alphabetically; with some figures. Lettered on lower edge 'Mis[cellanea] Φ Vol: 1st'. 42 leaves are blank.

The sources include: Power, no. 3730; Ozanam's 'Math. and phys. recreations', 1708; Geo. Cheyne's 'Philos. principles', 1715; Boyle's works, abridged by Shaw, 1725 or '38; N. Regnault's 'Entretiens physiques', tr. by Th. Dale, 1731; &c.

gold & silver require different mediums to dissolve them
for Gold requires aqua Regalis, & silver aqua fortis. which also
dissolves all other metals

Pallida Luna pluit, rubicunda flat, alba serenat.

See correspondence from
Henry Viets, October 3, 1966
for possible correction re
Cheyne's Phil. Prin. Nat.
Religion .

1v. (Powder. 'custom. Chem. – very large pop.'

2. Denyed (assumin) date 1962?

2-3 physics.

6v. 'Ozman's Math. ~~[illegible]~~ Recreations'
by Jacques Ozanam, 1640-1717.
his 'Recreations in Mathematics' (1st ed. 1803) 2
1st in Lat. & Eng.

7. Boyle, 'Phil. Wks. Abridged by Shaw', 1725-38.

16. N. Regnault. 'Entretiens Physiques', 1729; tr. by Thos. Dale, Lond. 1731, 3 vols.
(Watt: does not give Eng. title. – called here 'Dale's Phy, vol. 1')

22. Dr. Abraham's 'astro-theology', 1715.

23. 'The Friend' shows about 40 years ago that the pendulum vibrates the slower, the nearer to the Equator.

24. Flamstead 1646-1719 / Varenius. Geographia / Eng. 1734 / Veron. Ges. P. 28 / ~~Veron. Geogr.~~

25. Cheney's Philosophical Theory
i.e. Geo. Cheyne M.D. (1671-1743) 'Phil. Principles' 1715.

26. Fontenelle 'Dialogues of the Dead', 1708

→ l. 2 used could not be written in 18th cent.

56. moon mottle .. .. .. – 1916.
'Nature displayed'

57. Power (Hy) F.R.S. 'Experimental Philosophy', 1664
3730. no. 3730

Watermark: Lion and 'Pro Patria'
Pl. lines 21-22.

Only mention of years
are leaf 23v.

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for Gold requires aqua Regalis, & silver aqua fortis. which also
disolves all other metals

Pallida Luna pluit, rubicunda flat, alba serenat.

to the Bank of Montreal, West
l, for credit of your account,
$25.00 being monthly allowance
rust - $50.00 less payment to
$25.00

Yours faithful

Fa

F.A.Lister
For Manage

Watermark Lion and Pro Patria
C & Lions 21-22.

Only mention of years
see leaf 23v.

92 - Benj. Martin 'Philos. & Grammar,
1735
→ 98 Discourses with Mr 'Godfrey, the chemist'
|| i.e. Hildebrand G. - father or Son
died 1741 & 1756.
III Bradley (Chas) Phil. Acc. of the of Nature
1721.

Altitude — The altitude of the sun or star is its height above the Horizon measured by the Degrees on the Quadrant of altitudes.

Azimuth. — The Azimuth of a sun or star is its distance from any of the four Cardinal points E. W. N. or S. measured by the degrees on the Horizon. not when it is spoken of the Sun's Azimuth in gen. its distance from the South is meant.

Amplitude — The amplitude of the sun or star is its East or west azmuth at its rising or setting

Aqua Fortis. — Put a small quantity of aqua Fortis & of the filings of brass into a bottle & it will immediately seeme to Boil. oil of Tartar & oil of vitriol mixt will also cause a ebullition

Aqua Regia. — is made by dissolving sal armoniack or sea salt in Aqua fortis.

Aurum fulminans. — Take 3 parts of saltpetre, 2 parts of salt of Tartar & one of sulphur powned & mixt together 60 grains of which heated in a spoon will make a very large explosion

the reason of its Explosion see Page 97th

Asbestus. — of Corsica whereof is made an incombustable cloth & paper see Phil: Trans: Vol 22 Page 911.

Arianism is The Doctrine & opinion of that noted Heretick Arius who Denyed that the son of God was of the same substance with the Father. Ari=tel.

Argument of any kind lose a great deal of weight, when we are Perswaded he Either writes or talks only for argument sake, & has no real concearn in the thing he Espouses.

Air its Properties The Chief properties of the air are Fluidity, gravity & Elasticity. In the first place, the air is fluid, or Consists of parts of a globular figure, without any sensible attraction or Cohesion be twixt them, & which therefore easily glide one over an other yeelding to the most slight Impression. We need no other proof of this than the ease & freedom of respiration. Secondly that the air does gravitate is demonstrated by many experiments as one for Instance that is very Common. take two tubes of any Diameter one of tin forty foot long & another of glass fourd foot long both stoped at one End, fill the glass tube with Quicksilver & then Invert it, immerging upon the open End of the Tube in a Bason filled with the same fluid so that the closed End may be perpendicular to the surface of the Quick silver in the Bason: then will the Quick-silver in the tube run into the Bason till it comes down to be 27 or 28 inches above the surface of the fluid in the Bason, at which height notwithstanding the specific gravity of the quicksilver, it will remain suspended in the

how it is certain nothing can sustain the weight of mercury in the Tube but that Counterpoise on the remaining surface of the fluid which by all discoveries can be no other than that of a column of air of the same Diameter with the orifice of the Tube pressing on every other Equal part of the fluids surface which not being counterbalanced by any air in the Tube, raises or suspends when raised, a quantity of mercury Equal in weight to its self in order to Constitute an Equilibrium. and this appear certain for if you open the closed end it will Immediately subside the aire pressing on the mercury within the tube with as much force as it does on the mercury without. the Experiment hold Equaly good in a Tube 40 foot long, the only difference is, that it is in this made with Water is in the former with mercury. Thirdly the Elasticity of the air is not less demonstrable than Either its Fluidity or Gravity. take a little glas ball with a hole in the top; into this thrust a glas tube about half way then fastning it to the orifice of the globe with mastick so that no air can pass between, this being done fill the globe half full of water, then take it out & blow in it as hard as possible, upon which the first air will contract it self to make room for the second. this little body of air being thus compress

Anvil how to support one of 600 Pounds see Page 24.

& Imprisoned within the sides of the glass bal
Endeavours to get loose & Expand itself with some
violence, as to force the water above it, out at
the top of the little tube, making it to spout up
into the air 3 or 4 foot high. as these three
Properties of the air have been demonstrated it
will be necessary to Enquire into the Causes &
Effects of these Properties. the Fluidity of the
air, like that of all liquids, does probably proceed
from the action of some more subtle body that
pervades & seperates the parts of the other. thus
gold & silver are put into a state of Fluidity by
the action of fire which penetrates & dissolves the
parts of these bodies. to the same cause we may
ascribe the fluidity of water, it not being a fluid body
of its self, but is made such by Certain Particles of
Fire or air, which Insinuating themselves betwen
the particles of the water, do by their activity keep
it in a Constant state of fluidity & motion, & when
this is in a great measure destroyd by Excessive Cold,
the Particles of water settle into a state of rest &
form that Consistent body we call Ice. it is not absurd
to suppose that the air itsef is a fluid only by means
of the Interposition of a very subtil active matter
between the parts of it & in which it swims. this subtle
matter may be Called Ether & is probably Endowed with
this active power to give vigour & motion to the other Elements

Eaven to the Fire itself. as God has decreed that all Bodies that compose the material system shall have a tendancy towards their centre; & that the degree of their accelleration should be in proportion to their respective densities & to the resistance they meet with from those fluids they pass through. from the first law it follows that a feather & a ball of lead should descend with Equal velocities when not obstructed in their descent by the air; whereas on the air or Water they will descend with different degrees of velocity according to their different dessities. by the same law it would likewise follow, that all the air in the atmosphere should descend upon the earth, & form one consistant mass of matter, but that by a consequence of the second, the Ether which serves as a medium to the air, & wherein it floats, prevents its descending by communicating to it motion in contrary directions so that the gravity of that vast Body of air that surrounds our Earth becomes very inconsiderable & adapted to the constitutions & necessities of those that breath it.

Elasticity of the air.

The elasticity of the air results from the particular structure of it. it is very probable that every particle of the air consists of several leaves or folds like a Book or a paid of bellows; & consiquently the air must swell & dilate itself in proportion as the Etherial

water or the fire, insinuates itself between the parts
or pores, & on the contrary contracts & sweats itself
as it is impelled from between them.

Evaporation then takes place by the rarefaction of the air.

The heat of the sun first causes a rarefaction of
all fluid bodies, & so insinuates itself into the
substance of the air, & makes it fluid to
the greatest degree, rarefying the air, & consequently
those globules of water in which it is included. Hence
these particles being reflected back from the surface
of the earth & water carry with them those
water bubbles, into which they insinuate themselves
together with corpuscles of different nature, that
happen to be mixed with them. The fire rarefies
and rounds the inside of the bubble, while the
greater & the other more particles, which are
in some sense from the earth go to form the shell
or exterior. These little globules thus formed begin
to rise than so many small balls of rarefied
air at the bottom of the atmosphere must
necessarily ascend into those regions where the
air is of the same specific gravity with themselves
where they remain in equilibrio. [illegible]
When these bubbles which are centered up & down in
the atmosphere meet with a cold air which has
more strength & contains less [illegible] which is in

the water has to dilate them. For the particle of water which is in the center of each bubble [illegible] itself causes an equal pressure, [illegible] the same quantity of water upon [illegible] which is upon them above; [illegible] bubble [illegible] possess an equal [illegible] of air, & therefore by the known laws of hydrostatics must subsist [illegible] consequently, in proportion to the weight of these bubbles above that of air, they will descend with greater or less velocity [illegible] different forms of Dew, Mist, or small Rain.

If these bubbles meet in their descent with an air so cold as to freeze them, they condense into flakes of snow of different sizes; & as snow does always consist of air, vegetable salts & a particle of water shut up in the centre of this little [illegible] called [illegible]. It must necessarily follow that the land which it falls upon is enriched & fertilized [illegible]

[illegible] it or shall consult a [illegible] poet, he [illegible] the [illegible] meet, & the [illegible] in which [illegible] to [illegible] it is [illegible] at [illegible], he describes water that after instilled at a part of it

must Comp[illegible] much up space, [illegible] is a truth Confirmed by Experience & Consequently an argument of the [illegible] [illegible] of [illegible] decrease of [illegible].

Great Rain

When a Torrent of Air happens to force one [illegible] against another with a violent shock a great part of the Bubbles burst & dash one against another for in [illegible] [illegible] according to the different force with which they act upon them, either in a perpendicular or horizontal direction; & the weaker the burst the [illegible] the more full [illegible] of each others attraction, & [illegible] which is the reason that Rain is for the most part so small that descends from those Clouds that are so near us whereas it falls [illegible] from those that are a great height above us.

Falling Stars Shooting

From those Fiery particles [illegible] in the Centre of the Bubbles before mentioned, & from the [illegible] particles of oil, sulphur, nitre & other combustible matter raised up to the higher regions of the atmosphere along with the rarifie Exhalations, a great and flamable substance, which comes more or less visible according to the different strength of the Exhalation & the quantity of it, if the quantity of fiery particles

[illegible] from the bubbles of water upon the collision of the [illegible] so very small, [illegible] a [illegible] of fire, which does not [illegible] a [illegible] of fire & stretches disappears. this is what the [illegible] people call a falling star.

When the cloud is pretty high & large extent of air, & [illegible] the [illegible] flaming matter which happens to be within the sphere of its attraction, it is what we call Lightning.

When the lightning descends in great flashes the air is heat hotter, it is what we call a Thunderbolt & this has different effects according to the disposition of the air, & the different forces & proportion of those [illegible] which enter into the composition of the Lightning.

The air which gets loose from these broken bubbles in which it was before imprisoned, & that which happens to be gotten in between the drops, is rarefied very much & here, by these inflammable substances & therefore being hemmed in on every side by thick clouds which continue [illegible] heaping together round it on the falling in of one cloud upon another takes by its expansive force burst its passage through them with a violent explosion & causes that crack or rumbling we call Thunder. the flash seems antecedent or reference reason of the [illegible] being effected from the surfaces of different [illegible] which [illegible]

Summary refutations of Eachard's [illegible] Reason of the Earth.

Battalion a body of foot soldiers consisting of 600 or 800 men

Brass is a sort of Copper, mixed with Lapis Calaminaris, according to Job 28th 2. Brass is molten out of the stone; that is by the heat of subterranean fires the stone is transmuted into the substance of Brass: it is dug out of mines in Italy, Germany & is also factitious or made by art.

Brass.

As the specific weight of Wood is less than that of Water, & as the weight & the air which are in the Barge together with the Timber it is made of, do all form a body of less weight than a volume of Water whose place it fills, therefore the Barge does not sink. Suppose a Barge 100 feet long, 30 broad, & 100 multiplied by 30 gives 3000 feet. If we suppose the Barge to draw two feet water, the cubic total will amount to twice 3000 or 6000 whether of Water or weight; for as soon as it is filling an equal space with water, which was the whole, the pressure of the Barge upon the River is no greater than the pressure of a body of water whose place it supplies. Suppose a cubick foot of water is equal in weight to 70 lb. if therefore we multiply 3000 cubick feet of water the dimension of the volume of water which is displaced by the Barge, by 70 the sum given will be 210000 which is the number of pounds that that Boat

Boat the reason why so great a burden

B. CHELEGHLKLMNOPQRSTUVWXYZ

of Water weighs, & consequently the weight of the whole Barge & its burden to be transported.

Ozanam Math: recr. Prob. 241.

Bread made in Quicksilver.

But into the Sea or a natural Fr. put the Infusion of powder quicksilver & stopped close: & when it has been boyled it the Bread will dance in the Sea. Thus the mass of Quicksilver put into a pot where Bread or Fr. Bread & the Sea put upon top of the pot as soon as the water begins to heat, in the mass of Quicksilver put into red bread will [illegible] up & down the Tallest Man [illegible] heat without fire in a Circular motion.

Ozanam Math: recr.

Sum a vint water it.

boil over a gentle fire, in common water kept and stirring it perpetually till no further scum arises: then expose it thus melted to cool in the clear air three or four nights. after this melt it again in an Earthen Kettel over a slow fire & strain it through a linen Cloth into Fr. water & after wash it well in fair river or fountain water to take away its salt, which will make it become whiter as snow. then put it in a glazed Earthen Kettel or [illegible] Zaza [illegible]

Bears [illegible] natural [illegible] Bears, [illegible]
[illegible] with quick times into a posture [illegible]
[illegible] off. [illegible]
[illegible] Dr Shaws Zoology of Birds p 137

Birds [illegible] white in northern Countries in the winter & other
Manner see Birds Page [illegible] in end of this Book.

Bodies [illegible] the Cause of the Consistence & Coherence of the Bodies
of which they are Composed.

The Ultimate parts of Bodies are very fine with solid
& strong particles, such as may in some measure
resist their Separation & Dissolution, it being
a Rare Phenomenon Considered, that bodies
of all sorts are formed, are not broken
in pieces & dissolved as we imagine on the
Slightest stroke together of Surprising natural
rather Sphere & are united by mutual Attraction
so that the smallest particles of Matter may
be strongest attracted & Greatest Bodies have
of weaker virtue; & many of these may Cohere
& Constitute larger particles whose Virtue is
weaker. Since particles of Bodies [illegible]
a large superficies Gathering & mutual attraction
their parts, Constitute a Body [illegible] if these particles
are not so strongly adhered or Tangled with each other
they may easily be Rubbed off; it has much more another

[illegible]

[illegible] P. 64.

[illegible] beat the cause of [illegible] P. 65.

[illegible] end of Spirit P. 46.

Beetles v. P. 26.

[illegible] P. 51.

[illegible] but this [illegible] does not [illegible] the light [illegible] it is [illegible] to [illegible] with a [illegible] light [illegible] [illegible] light only appears in parts, [illegible] Prism.

8

A B C D E F G H I K L M N O P Q R S T V X Y Z

C D E F G H I K L M N O P Q R S T V X Y Z

G
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Effect of Cold

Cold if it approaches near the Earth, presently precipitates the vapours, either in dews: or if the vapours come so nearly upon & soon meet the Cold, they are then condenced into mistiness: if the vapours are not only copious, but also as heavy as our lower air, in this case they become visible, even tho' a little hight above the earth & make what we call a mist or fog. But if they are a degree lighter, or else not higher than a very great height, or else meet not with Cold enough to condense them, or wind to agitate them they then form a heavy thick cloud. Eccles: Ch: 20

a Cohort

Consists of 555 feet & 6 hours.

The reason that Comets appear with blazing tails & that no other Planet or Star does the like seems to be owing to some peculiar aetherous matter in the Bodies of the Comets, which by their approach to the Suns Body is prodigiously rarified & made to fly off in a fiery vapour on that side opposite to the sun.

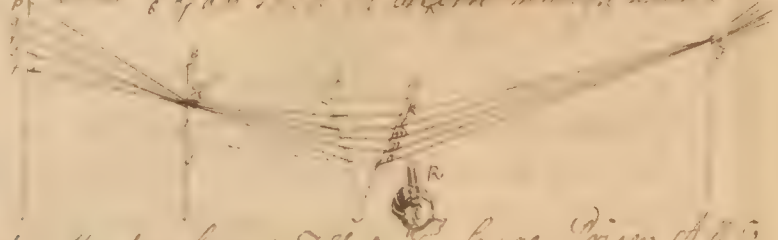
Comets

Colours are distinguished in degrees of light & of the different degrees of it reflected; for those rays which are least refrangible, constitute red & paint that colour in bodies, & the rays most refrangible; as violet purple & paint them with; & the intermediate degrees of refrangibility are dyed with the intermediate colours of the range, & red, & green, & the range which may be proved by the following experiment. In a Room made

Colours

GDEFGHIKLMNOPQ

dark, make [illegible] further
at [illegible] breadth through which



[illegible] enter the Sunbeam FR & a large Prism ABC
placed about 20 feet from the Hole will refract the
Rays of this beam approaching them will again unite
[illegible] a white beam at H where let be applied
an opake Body GHI at the distance of 2 or three
feet from the Prism in which let there be a long
hole made at H $\frac{1}{40}$ or $\frac{1}{50}$ of an Inch in breadth through
which the white part of the beam being transmitted
may fall on a Piece of white paper where
paint the primitive original colours of light, viz.
red at t, orange at s, yellow at q, [illegible] p.
then with a piece of pasteboard [illegible] intercept the
Rays k, l, m, n, o before they come at the Glass at t, s, r,
so possible the other Glass will [illegible] as before, so
[illegible] we learn that the Rays of light paint tinted
bodies with different colours that the least refrangible
[illegible] at t paint red & the most refrangible [illegible] at p
paint the deepest Purple violet & the other intermediate
refrangible Rays the other Intermediate colours: thirdly
that these differences of colours are absolutely & really
[illegible] in the Rays of light & do not arise from the confusion
[illegible] light as hitherto supposed.

[illegible] great men are the proper object of criticism, let the faults they commit should serve as a rule to inferior writers.

Colours. From the following Experiment may be [illegible] that Colours are not Innate qualities proceeding from substantial forms of [illegible] but are only they are said to be [illegible] by a bare mechanical change of texture [illegible] the minute parts of Bodies [illegible] may in a moment be generated or new & again utterly destroyed. The Experiment is thus performed take good Common sulphurous Spirit of Nitre with what quantity of Water you please, carefully filtre the Solution through clean Linen that it may drop down clear & [illegible] to a spoonful of this drop 30 or 40 drops of Oil of tartar per deliquium well filtred & shall change it into a very Amate colour in which if you add two drops of [illegible] it shall [illegible] Entirely alter the colour.

If Some chrida of a [illegible]

DEFGHIKLMNOPQRSTUVWXYZ

colours

there is a way of producing a purple by infusing the powder of roses in pure water, after it is sufficiently red by dropping therein a little sal armoniac the colour will be immediately changed into a lively purple, as I have mentioned.

colours in the effect are rather like a disposition of the parts thereof to reflect this or that sort of rays more copiously than the rest.

colour depends from

The minute corpuscles that compose light, may easily insinuate themselves into those pores of bodies which to their size appear wide, & then pass, they may crack or in separately fall, in which latter case they will for the most part alter the number & figure, but not the magnitude of the former pores. In what capacity so ever these corpuscles of light come to be lodge in the pores the surface of the body will commonly have its disposition altered to the incident light that meets with it, so as to be little disposed to reflect

would have the rays refracted, absorbed or reflected more or less irregularly than in its former state.

[illegible]

[illegible] and consist for this reason that when the [illegible] from the same horse, but if a drop of ink be let fall on white paper the part of the paper will appear much darker than the rest. By this means [illegible] of the different rays of light which have been [illegible] to reflect to the eye. [illegible]

The diversity of colour of the species [illegible] alterations in the disposition of their parts, the different sort of the rays which [illegible] from affording but a diversity of colour [illegible] some great difference in bodies. Instances of this are shades in several sorts of fruit, others [illegible] the leaves [illegible] passing from one [illegible] of vegetation to another [illegible] from one colour to another. [illegible] offers another instance of this kind. Put [illegible] heating it a little [illegible] painted [illegible] then the [illegible] but [illegible] a [illegible] of water [illegible] it [illegible] from a little heat to a more [illegible] immediately given to the water. The [illegible]

D E F G H I K L M N O P Q R S T U V W X Y Z

[illegible] and if you [illegible] [illegible] [illegible]
of [illegible] & heat it in the flame of a candle
[illegible] the spirit [illegible] [illegible] [illegible] [illegible]
distant from the flames, it will [illegible] pass
from one colour to another, as from a bright yellow
to a deep & reddish yellow, from thence to a purple
[illegible] & then to a deeper blue, each of which colours
argue such a change made in the texture
of the steel that if it be taken from the flame
& immediately plunged in yellow, whilst it is
yellow it will be of a hardness fit for
drills & gravers, if purple till it was blue it becomes
much softer & proper to make springs for
watches, which are the proper tempers of that colour
& if kept still longer it will grow too soft even for
[illegible]. [illegible] [illegible] Boyles. works. vol 2 92.

[illegible] [illegible] ent from [illegible] [illegible] to make one [illegible] to be of different colours
[illegible] [illegible] the spirit [illegible] tincture of benzoin [illegible]
[illegible] which [illegible] [illegible] the quantity of [illegible]
[illegible] of minium in spirit of vinegar [illegible]
[illegible] [illegible] a fine purple, into which drop
as much spirit of sal armoniac as will precipitate
about half the [illegible] & immediately stirring them

[illegible] pretty in that of a curdled substance

[illegible] a fresh purple colour upon which instantly pouring a pretty quantity of spirit of salt, the matter [illegible] purple [illegible] the conical figure of the glass preserves, from the spirit of salt which suddenly precipitates [illegible] a pale lee of white powder or the remaining [illegible] of the [illegible] part [illegible] not struck down. So that one [illegible] the glass [illegible] distinct [illegible] substances a purple or violet colour [illegible] at the bottom, a white [illegible] [illegible] [illegible] of a [illegible] [illegible] [illegible]

That the colours of bodies pretty depend on the bulk & figure of their superficial particles, seems probable, since many ancient & modern Philosophers have thought that all colours might be accounted for from them alone.

A liquor may alter the colour of a body by [illegible] its parts, either by dissolving those layers of particles which stick more closely together and by means of

DEFGHIKLMNOPQ

[illegible] cannot easily [illegible] so this seems to be the Case in many of these fermentative experiments where the Colour of some Corpuscles brought to [illegible] by being precipitated together is destroyed Either by effusion of some sharp & piercing Liquor, or by dividing the greater parts into minuter ones which will be for the most part otherwise shaped than the Entire Corpuscles so divided.

Imitation of Colours see more of this Page 25th

Make a Tincture of red Rose leaves with a little Oyl of Vitriol & a large quantity of fair water pour this off into clean water till the water held against the light require a competent redness into this drop leasurely a little spirit of urine & shaking the glass & holding it up to the light you will see the red Liquor Immediately turned into a fine greenish blue. if upon the falling of each drop of spirit of urine you shake the glass you may observe a pretty variety of Colours in the passage of that Tincture from a red to a blue.

Crystallizations

See the End of the book P. 6th [illegible] Shaw's Abr. of Boyle's Works [illegible] [illegible] et [illegible].

[illegible] will be found the [illegible] of De Reaumur's [illegible] [illegible] leaf [illegible] [illegible] surface [illegible] but a even

Concave the darker. It becomes concave before we can perceive it, & the more powerful it seems to convert the are stronger. The quickness of the light makes the Sun to seem to shake, keeping the course of the instant spirits in a robust impression.

It is found by Experience that Rays are Compound & very Heterogeneous, & dissimular to each other. The light being received on a refracting surface [illegible] is not wholly refracted to one point but [illegible] figure in the margine are refracted to L [illegible] which are the most minute are of all other [illegible] easily & most considerably diverted by the [illegible] refracting surfaces out of their [illegible] right lines Causes & the [illegible] each Ray as it differs in it [illegible] degree of refra[illegible] & [illegible] this is evidenced by numerous Experiments. [illegible] are most separate [illegible] considerable [illegible] in all [illegible] the [illegible] of light thus separable [illegible] the [illegible] refraction. [illegible] the last reflection [illegible] found to be the largest particles of light [illegible] the largest of the [illegible]

DEFGHIKLMNOPQ

[illegible] seperated [illegible]

[illegible] of different Colours

[illegible] the [illegible] of different sounds. Further the Colours of these [illegible] modifications

[illegible] properties [illegible]

[illegible] Colours, by mixing them [illegible]

[illegible] Prismatic Colour of light

[illegible] Reason why while the Colours of the Prism [illegible]

[illegible] which [illegible] yellow [illegible] than those which [illegible] red [illegible] than those which [illegible] yellow [illegible]

[illegible] which the light is [illegible]

[illegible] yellow [illegible] rays [illegible]

Drills how made red colours.

Dipping as a wedge

the Particles of water by their agitation drive & repel from the Interstices or Pores of different salts the air they penetrate them as so many small wedges divide break & dissipate the parts. the same quantity of water cannot dissolve a certain quantity of common salt because the points of the water being blunted by striking against the parts of this salt, find no more access into its pores. the same water does not yet cease to dissolve a determinate quantity of sugar. the reason is the particles of Water are still fine enough to enter into the larger pores of sugar but as they are blunted more & more they become too thick for penetrating into sugar.

Obt: 1st Dales Exp. 1267

Breathing sound

Have we water or at least pipes in their stead so that the cause of the death would be stop[illegible] of the blood ~~[illegible]~~ so as no [illegible] it must therefore be continued [illegible] otherwise the Excessive dilatation would break the vessels & the Extravasated blood ceasing to circulate would stop back to turn life into the [illegible] part of the [illegible] body & the air which goes first temperate the blood & preserves life. besides if the air did not circulate in the vessels of the lungs they would be contained in their proper [illegible] & [illegible] their vessels would not [illegible]

DEFGHIKLMNOPQRSTUV

sufficiently Extended. the External air being not [illegible] to Circulate would [illegible] their Elastick; the Blood would not find free passage [illegible] in the [illegible] of the Lungs, the [illegible] would be interrup[illegible] [illegible] fluid with it. [illegible] vol 2d 195.

Death [illegible] that: v: J: 65

E F G H I K L M N O P Q R S T V X Y

A

E F G H I K L M N O P Q R S T V X Y Z

E F G H I K L M N O P Q R S T V X Y Z

E F G H I K L M N O P Q R S T V X Y

Enamel. The general opinion that the art of painting upon glass is lost, is without foundation, since that of enamelling is still in use, which is the same art with the other, but only in miniature on glass. Pewter or lead with divers colours is the matter of enamel & which will stick to metals for a long continuance of time. The colours are given out the fire of a lamp which is made hot enough to melt them; he draws out his colours into fine threads or strings like those that proceed from a stick of melting sealing wax & these he draws to what length he pleases; having made this provision of materials & fitted a hand he melts at his lamp the extremities of such threads as he has occasion to use & immediately applies it to that part of the figure he is upon, & thus with much patience as well as dexterity he performs his work.

Earth objections & its nature answered. The most reasonable objections against the earth's motion are these. 1. That if the earth be pierced from N to S a ball dropt down would have a farther range than one that advance: viz. if

Lord S. it would miss the mark; or if Sappinciad
accurat it would drop to the westward of the Gun.
that a weight dropped from the top of a Tower would
not fall at the foot of the Tower, we see it
arth, with troubling the laws of motion the rules
of Mechanicks or Mathematicks the following
will be a sufficient answer. let any one Gent
be set up in the Cabin of a Ship, & let him have
a bottle of water up so as to Empty it self drop
by drop into another bottle with a narrow neck
let him also have a parcel of Gnats & other
little winged Insects. while the Ship lies still
diligently observe how those winged Insects fly
with the the witness to any part of the Cabin
& how the descending drops all fall into the
bottle underneath. & if you leap you will reach
as far one way as another. having observed these
particulars whilst the Ship lies still make the Ship
to sail with what velocities you please & so long
as the motion is uniform & not fluctuating this way
& that you shall not perceive there is any alteration

in the aforesaid effects, neither from them can you conclude whether the ship moveth or standeth still. so that there shall not (power) the least drop of the water on the floor wherein the ship shall have run many feet whilst the drop was in the air. by cause of which correspondence of the effects, is that the ships motion is common to all things contained in it & to the air also when shut up in the cabin. Varrans vitruvius. See the preliminary discourse.

F G H I K L M N O P Q

To represent [illegible]

To represent water pour upon the [illegible] a sea colour.

To represent the air pour upon this composition [illegible] a celestial blue or air colour.

To represent fire pour upon all three the oil olive which gives its colour brightness & subtilty [illegible]

See writ. see more at end of the Book Page 3.

Doth that of Dates is most Palatable &c. Dict. Page 11th

Wh. the reason they repeat more in the night than [illegible] because in the silence of the night the air being more calm [illegible] agitated with fewer [illegible] things [illegible] more easily & from a greater distance the Impressions which it receives. Dict. Phys. Vol. Page

Eggs how hatched Eggs being once formed, are hatched by a certain degree of heat which agitates the liquid matter, which encloses the Embryo; the heat divides this matter, attenuates digests, & makes it pass through the navel into the [illegible] of the little Animal. the vessels which receive it successively, direct it towards different parts of the body, in order it may be nourished accrete & live. In Egypt they hatch eggs in Ovens for a particular account of which see Dict. Phys. Vol. 2 Page

[illegible] how caused It is supposed that frequently there [illegible] a great quantity of sulphur [illegible] [illegible] [illegible] subterraneous caverns [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] with the salt peter [illegible] [illegible] of the [illegible] [illegible] [illegible] of the [illegible] [illegible] mixture [illegible] the [illegible]

Mists

Mildew.

FIGHTKIFNOPQ

Should a mixture of vapours & specialy a mist, be
thereon. elevated off the heat of the Sun, happen to be cool
& condensate, & at last to fall down in its proper weight
after sun set, this is the clamp.

Mists are thick collections of power vapours & exhalations
which their weight or the cold that condenses them
hinders from rising more above the surface of
the Earth, the Cold which unites the vapours &
exhalations, renders the mist perceptible, as it
makes the breath & sweat of horses perceptible in
winter by reuniting the particles, which the heat of
summer dissipates.

Dew the mists charged with nitrous or sulphurous
particles, capable of scaring the Tops of plants
Ears of Corn, or tender fruit, if these corrosives
happen to fall in small Rain it is mildew. this
attached to Leaves; the Points of its nitrous & sulphurous
corrosives sink into & disorder the Pores & Circu-
lation of the Juices; the plants & ears of corn are
dried up & fade away for want of nourishment.
When the rays of the Sun pierce the mist the heat
rarefies it, the rarefaction renders it lighter, and
lighter it is elevated in a cloud, or dissipated, sometime
the lighter parts being separated from the proper by the
heat are lost in the Atmosphere while the grosser
parts fall down again upon one another in drops or

o prevent them it a man take a Rope between them in a gown of a town of narrowness there will spirits off & death of it must be peaters before um with them of ome of corn com o war till Sieges of danger. is now practised in France.

compose a species of long white thread, which floats at the pleasure of the air & to which they give the agreeable name of the Hair of Venus.

Dales Phy: vol: 3d p 96.

In mixture forms a ~~[illegible]~~ kind of [illegible] which may be easily set on fire by either the inflammable breath of the Spirits, [illegible] dashing them [illegible] the fall of a flint or stone, or the fermentation of vapours, hence we account for Earthquakes & the places where these discharge themselves are called volcanos. Varenius's Geogr: vol 1st p

[illegible] which was formerly thought to be perfectly spherical [illegible] found to [illegible] [illegible] [illegible] or that [illegible] round its own axis: so that the [illegible] longest which is nearest the [illegible], [illegible] more remote? [illegible] about 40 years ago, [illegible] that the [illegible] much the slower, [illegible] brought to the Equator: that is the greater or [illegible] of the pendulum & all other bodies [illegible] in countries approaching the Equator than in those nearer either [illegible] their weight. [illegible] the reason of the Earth round its axis which [illegible] according to the laws of circular motion, repels all heavy bodies from the axis [illegible] that this motion being

it

forms

swifter under the Equator than in parts more remote, the weight of Bodies must also be much less there than nearer the Poles. Therefore the parts of the Ocean under the Equator being lighter [illegible] according to the nature of all fluids, [illegible] [illegible] than the waters nearer the Poles, [illegible] [illegible] a greater height [illegible] [illegible] [illegible] the greater height of the Continent waters. The figure of the sea being conformable to the lands adjacent which are everywhere raised above the sea the aforesaid form must be attributed to the whole terraqueous Globe. The same [illegible] of [illegible] is found in the Planet Jupiter by Flamstead, that much more than in our Earth, which plainly proves that the difference arises from the circular motion since the diurnal rotation of that Planet is more than twice as swift as that of our Earth. Veren: Geo. p. 28.

The Earth is nearly of a spherical form because a sphere is not [illegible]

Leaf 23v: "French … experiment about 40 years ago".

Probably from Bernard Varenius (M.D.), 'Geographia generalis' (Amst. 1650, Camb. 1672, '81, 1712), Shaw's Eng. trl. 1734. Does this refer to Jean Richer's observation, in Cayenne in 1672, on the retardation of the pendulum near the equator? The French expeditions to Peru and Lapland were not sent till 1735 & '6. (cf. Brunnemann, no. 5789, ii, pp. 270 and 386.)

[illegible]
[illegible]
[illegible]
[illegible]
ted all
[illegible]
ham [illegible]

is the natural cause of the [illegible] of the Earth.
Veren: Geog: p. [illegible]

compose a species of long white thread, which floats at the pleasure of the air & to which they give the agreeable name of the Hair of Venus.

Dales Phy: vol: 3d P. 96.

[illegible] Fire or Earthquakes. Derenius Georgic: vol: 1st P.

[illegible]

Term.

[illegible]

[illegible] the axis [illegible] the [illegible] circular motion, [illegible]

further from the Equator than in parts more remote, the height of Tides must also be much less here than nearer the Poles. Therefore the rate of the Tides must be so small, that it wanting the nature of that Tide, which is to be the greater nearer the Poles, it must be made to be a greater height, that it may better support & bear up the great weight of the Continents towards the Poles of the Earth, & the adjacent Islands, which are everywhere more above the sea the closer from point be shall be to the whole terraqueous Globe. The same Inequality of Tides is found in the Planet Jupiter by Flamsteed, that much more than in our Earth, which clearly proves that the difference arises from the distance of the Moon, in the diurnal motion of that Planet is more than it is in that of our Earth. Veren: Geo: p. 28.

The Earth is not of a mathematical form because there is not in Nature to decay, & decrease as upwards, because the parts are equidistant from the centre, as we have shewed by Isaac Newton & Huygens, that the diurnal motion at the Equator, & the power of attraction upon all the matter of the Universe, proceeds of Forces, & all the parts of Bodies, which attract themselves to the centre, which at the Equator is the natural cause of the [illegible] of the Earth.

Veren: Geom: p. [illegible]

[illegible] V. 29 4th

[illegible] force of ye Particle

[illegible] a stroke or

[illegible] recover its former [illegible]

[illegible] or approaching thereto; for were the [illegible]

[illegible] consequently ye would [illegible]

[illegible] various sizes

[illegible] supposed to be almost Infinitely

[illegible] ye Particles of ye 2d order as supposed to be composed

[illegible] less dense & Elastic, being pervious to Particles of

[illegible] Particles of ye 3d order are [illegible]

such proportion to them in Size, density [illegible]

[illegible] all doubt ye quantity of solid matter in [illegible]

[illegible] ticles of matter to be Cubes & to [illegible] ye fact of ye [illegible]

[illegible] be increased to any proportion [illegible]

[illegible] ties demonstrated, must have many times

[illegible] of all Bodies

[illegible] when made sufficient [illegible]

[illegible]

F G H I K L M N O P Q R S T V W X Y Z

of Generation

so that the parts in mixing run transverse another in accelerated motion & claim with the greatest force.

Flattery — men are like children, that are froward & untractable when rough means are used & unwilling to part with the foolish play thing; but a little Flattery loosens their hold & transports them their most valuable possessions. Sentimental Hist. & Brutus

Like Time — People ~~with~~ time to make themselves admirable by actions of which their names become a caught, may be said to pay the price, & loose the Purchase.

Force — Centrifugal is that whereby a body Revolving round a Center Endeavours to recede from it.

Centripetal Force is that Power where by a Moveable Body impelled in a Right line, is drawn out of its Rectilinear motion, to Proceede in a Curve.

Fathom. — A Roman fathom 6 feet & 6 inches. ~~and the 6 feet~~ the Roman measured from an Antique of Pompeia is. the Hebrew fathom somewhat more than 1 feet & 3 ins. the ~~orgia~~ or fathom of the Greeks Herodotus recons the same as the Roman. Dust & Chaume Imagined & proved from a Cloud may be floating in the air which particles are angular & pointed. these Insinuated themselves in the form of wedges into the pores of the particles of water & the humid substances so as to fix & Anchor their superficies.

Fermentation — If a grain of grain of wheat powder put into a bottle of Canary wine or of Champaine takes a little Liquor out of it & warms it over hot coals & presents it to the flame of a candle it will burn with violence

Fire — a way to distill it without fire & light see Prior Rec. at the end of the book P. pr. 3d.

Fruit — is refined by the heat attenuating to a certain degree. Water is the aqueous in fruit, & fewer the sulphur particles finer & more proper for mixing the tart with fermentation in the liquid maturity.

Flour — an inferior way how to preserve it from worms. See Plants lately brought to the Publick particular concerning flour P. 3. p. 6. &c.
See Barley P. 26. & Rice P. 51.

G H I K L M N O P Q

G H I K L M N O P Q

G H I K L M N O P Q R S T V X Y

G H I K L M N O P Q R S T V X Y Z

Glass Drops.

The drops being let fall red hot into cold water the external surface hardens into a crust while the fire still possesses the inside of the drop which falling into leaves a hollow or space within the crust and the rest of the drop not being broken by the external pressure of the air is kept from the return of its figure, which forming a curve or wheel round the vacant space supports itself against the weight of the incumbent air by resisting it equally in every part. whereas by breaking off the tick end of the drop you make a flat surface for the air to act upon, which nothing with no resistance within to counterbalance its pressure, it turns it to pieces.

Shining Glasses now made

A layer of Quick silver & a leaf of Tinfoil applied to the plane surface of a plate of crystal reflect all the rays that fall upon it, the white leaf which reflects all is seen white at the same time that all the objects from which those rays are emitted are clearly discovered. thus does this smooth plain have a Power of the most finished pieces of Raphael & Titian.

G. H I K L M N O P Q R S T U V W X

Nor does it like them, exhibit only the one & the same Representation for several successive: when a grand Company is in the Room, it represents you with a magnificent show of different groupes of figures: if you turn it towards the fires, it straight displays a beautiful landskip: or if it reflects but one single figure, it is drawn to the life without flattery or disguise.

Gold the Proportion it bears to Silver

The proportion which the weight of Gold bears to that of silver is as seven to fourteen, that is to say, if a Cubick mass of silver weighs fourteen ounces, a Cubick mass of Gold of the same dimension will weigh seven ounces. The proportion which the values of these metals is nearly as one to fourteen so that if a ounce of silver is worth 7 shillings an ounce of gold will be worth fourteen shillings as much.

Heating

A Smith with three ounces of fine gold, has first beat his metal into a plate as thin as paper, he cut it with his shears into pieces about one inch square which he parts between the faces of a kind of square pack which he moves up and down in a strong fire and

Lastly, the thing that a great hammer beat has been [illegible] a particle back to its [illegible] of the [illegible] [illegible] of the Book; it [illegible] then out, cuts them in fifty, & places [illegible] between leaves of parchment, repeating [illegible] of Hammering & cutting several times [illegible] brought it to a Gold leaf [illegible] first books, they are made to undergo [illegible] discipline in two others, which are [illegible] these former are called moulds, or [illegible] of leaves which instead of Parchment are [illegible] of Air-guts [illegible] these means for hammer a little [illegible] more than one ounce in weight [illegible] leaves three inches square, or into 1000 square [illegible] of four inches, which gives it above 120000 [illegible] more surface than it had at first. —

[illegible] shatter them to pieces & dispersed them [illegible] into the circum ambient space, as our Globe [illegible] the rate of 1000 miles an hour & is [illegible] [illegible] [illegible]

[illegible] the [illegible] dust
[illegible] the [illegible] or
[illegible] Centrifugal proportion
[illegible] 284 [illegible] [illegible] [illegible]
the [illegible] repair [illegible] necessity.

Dark: astrother: P. 148th

Cathe. rose is also [illegible] in this disease fine powder

gravel & stone

take of Camdratick, as much as will go upon
a shilling, [illegible] two or three times a day.

Golden number what meant by it. & how to find it.

The number of ye year at which the [illegible] moon
return to the same points they were [illegible] in
before is what is called the golden number,
so called by the Athenians who received it with
so much applause, that they ordered it to be
put in large characters of gold in the midst
of the Publick place. it has likewise been called
the Lunar Cycle. to find the golden number
you must add 1 to the number of the year &
divide the sum by 19 & reducing the fractions
into one the remainder which is the golden
number of that year.

a great split [illegible]

see Meth.

Burning glasses how commonly made

Burning glasses are generally made from a piece of glass, by a concave surface of brass being heated, will so soften the glass that all that is to make it sink into the form required. see watch glasses in Dr Shaw's Chem. Lect. & gilded gravers how made &c. there.

Grapes. Philosophicall ones how produced see Page 97th

Grafting.

To graft by scutcheon is to remove from off a tree a scutcheon or shoot with a great part of the bark, out of which it grows, & graft it upon another. then make a sort of covering of clay to the wounds of the grafted trees, not only to hinder the action of the air upon the wounds, but it seems keeps the plants, & renders them incapable of transmitting or receiving the nutritive juices, but that the nutritive juices ascending abundantly in the stem, are shut up from a possibility of ingress, constrained to fill the vessels of the graft, which it finds open. the reason the graft bears the same fruit as the tree from whence it was taken is because the fruit is produced from the graft which receives its seeds from the tree from which it was taken, [illegible]

a configuration conformable to the graft.
trees grafted are generally more fruitfull than
others because they commonly make choice for
grafting of sets, where there is more earth & a
more juice which is filtred through the grafts,
being more pure & more proper to nourish
& bringforth the fruit.

When you would have the shoots cover the wall
the same year & leave no vacuity in the Espalier
shalier you must pull off the blossoms, that is the sap
how to make them thick. not being employed in nourishing fruit & the blossoms
will afford more to the branches. if the
Branch of the scutcheon has shot out eight or nine
Inches it is good to nip it at the end, because the
sap being stopped by the part that is nipped dried
up & incapable of accretion will cause a great
number of small Branches to spring out which will
bear plenty of fruit the year following. Dales Hy. vol: 3 P. 30.
Galls see Page 96 near the End of this book.
Grafs the Invention of it Pliny attributes it to Hanno he says that some Carthaginian having
sailed through Thanicia with a Cargo of Pitch; being also stripping
their vessels about the river Bellus not being able to find any thing
to make their masts fast over rivers & pitch wrapped

tick pieces mixed & incorporated with the lead & run into the transparent stream, which soon concealed & taught the art of making glass almost two years before Christ. Glass vessels such as were found at Herculaneum may conclude they were in use in the 6th century before that the Romans made them windows & the shapes of their letters of which they called specularia, which was in all probability what we call Talc or Muscovy Glass Seneca speaks of them as of a cheap Ware in distance from hence we may presume they were in Esteem after the Southern of the Commonwealth.

Vesspasian ye 1st made Glass Cheap

H. P. p. 26th.

Cyal. a account of them V. P. 50.

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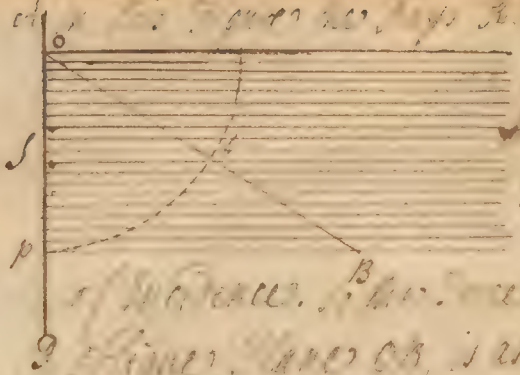
Why

the Reason that Man is so often burnt & sweat upon the ground is that there hot & sulphurous Fumes that are in it are exhaled & evaporate, which would otherwise lurk in the earth & not part with it. —

Heat the Reason why it is greater in the summer than the winter.

Now as the cause of the great difference between the Winter & Summer Heat (Viz. the Sun's greater Forwardness of his ascent above the Horizon in Summer time, which increases the Heat as much as it lengthens the Day & augments the Pole as much as it lengthens the Nights in the winter, so the cause is the oblique or Perpendicular direction of the Sun's Rays the oblique being weaker than the Perpendicular as is proved from the Nature of Light, exemplified as illustrate which was shewed yesterday in the positive Light. In which the Rays strike Perpendicularly or more shall & other Bodies, or the Rays fall obliquely. The same it is in the Nature of the Sun's Rays or any other name the Rays are it much more in the Eyes they are more & delightful, as the Rays are more or less Light & Heat or cum Recurvat. 1st Because the Perpendicular Rays strike with a greater force than the oblique. as



[illegible] AP more
[illegible] than the Plane OB.
The action or force of [illegible]
[illegible] exception in the [illegible] of all
other impulses, as the angle
of incidence. The force of the Rays RR upon the
oblique Plane OB, is as the sine only of ROB,
whereas their force upon AP is as the whole sine
of the angle ROP. 2. another Reason is
that a greater number or quantity of Rays
falls in the Compass or area of any plane, in a
[illegible] than a oblique direction. this will
be manifest from the same figure of the above
[illegible] it may be observed that all the
[illegible] between RR & Op fall on the Plane AP, but
only about one half of them, [illegible] fall on an
oblique Plane of the same length [illegible] OB.
also it may be observed farther that as the line OB is
longer than Op so are the spaces between the Rays
larger in OB than in Op & consequently fewer Rays fall
on OB for its length than on Op for its length, or the Rays
are [illegible] or more compact in Op than in OB & in
[illegible] are so much the more [illegible]

Evid

[illegible] the [illegible] following [illegible] [illegible] 37
[illegible]. Derh: Astrothe: P. 93.

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] A [illegible] [illegible] [illegible] [illegible] [illegible] weight B which will lower the string according to the dryness [illegible] or moisture of the air. [illegible] air is moist the [illegible] [illegible] [illegible] [illegible] into a [illegible] [illegible] [illegible].

The moist [illegible] [illegible] [illegible] [illegible] into them & are of so great a force [illegible] [illegible] rocks. [illegible] [illegible] [illegible] by this means to have a [illegible] [illegible] a cylinder they [illegible] it into several less cylinders by making several [illegible] round the great cylinder at distances. Driving [illegible] dry'd wedges [illegible] the millstone: & filling them with as many pieces of [illegible] wood [illegible] as [illegible] for when the wet weather comes they either swell & break or lose together the [illegible] [illegible] into several pieces. The [illegible] force of the air may be imagined from this. when [illegible] [illegible] great [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 10.6[illegible]

[illegible]

[illegible] is to be [illegible]

[illegible] is [illegible]

[illegible] is [illegible] that.

[illegible] in the leaves of Trees is the most Exalted part of the Nutritive Juice of Plants. this part of the Juice [illegible] & [illegible] by the heat is thrust into the [illegible] of the leaves [illegible] out [illegible] through the left contracted pores. hence Honey retains the [illegible] of plants upon which it was gathered. Doles Thy: [illegible]

Take a Quart of Linseed [illegible] & 2 [illegible] finely mix them on a pie [illegible]

[illegible] to one of this. If you dart Cake to keep out rain take [illegible] & dissolve them in [illegible] good Rosin for [illegible] thick as a Tolerom. [illegible] are [illegible] the Yellow [illegible] Green or any other Colour of Things [illegible]

I K L M N O P Q R S T V X Y Z

I K L M N O P Q R S T U V W X Y Z

I K L M N O P Q R S T V X Y

Ink — To make a quart of Ink.

Take 4 ounces of Blew galls, 2 ounces of Copras, one ounce of Sumaraback, one ounce of white sugar Candy & one quart of water, powder the galls before you put them into the water & stir them for 3 days thrice a day.

Ink Red how to make it.

Take the juice of an Sour Plum & put it in a pint of good Rose Vinegar, throw away the whole & strain what remains through a clean cloth then keep it carefully in a pint & by mixing a little vermilion here with, will make a very good red ink.

Ink that may or may not be seen at pleasure

Put into a new & well cleaned Earthen Pot, some fair water in which Infuse a little copperas with a piece of quick lime for 24 hours & so you have your fine water.

The water with which you write the invisible is a pint of distill'd vinegar filled to half a pint of an Ounce of Sharpes liver. These must be taken care of & stopped.

Take four ounces of brasil wood [illegible] one ounce of Cochineal one ounce of [illegible] alum powder all in a mortar to powder or mince them all to powder. Then pour on a pint of water or more as will cover them. Then let stand three days standing warm then strain the liquor three or four times through a clean cloth then put it into an Earthen [illegible] and let it stand in a dark place at least seven days off the flower of this dying substance [illegible] to be dissolved in gumed water for use.

Images [illegible] Mr Boyle's works vol. 1st p. 125.

Experiments of which the fibers are generally extended there were [illegible] when the liquor is near at its [illegible] fibers are [illegible] full of sap in proportion as the wood grows [illegible] the sap [illegible] the fibers are [illegible] consequently the fibers are distinct from one another & more moveable the [illegible] have permit them to make their vibrations more easily by making them [illegible] to make them with greater facility the [illegible] of the one is [illegible] changed by that of the other.

Tales Sh. vol 2 p. 25

[illegible] ink [illegible] you will not
[illegible] them the [illegible]
with [illegible] of the infusion of galls, you will see
[illegible] the invisible writing [illegible]
[illegible] from
[illegible] it from rusting
rub it over with vinegar mixed with cerule or with
the marrow of a heart. if it be rusty [illegible] of Sarsa
per delinium will preserve [illegible]
[illegible] Fatens what Inquired to be [illegible] P. 62.

[illegible] keep it from [illegible]
[illegible]
[illegible]
can [illegible] seed water
[illegible] the common
[illegible] lines
[illegible] or varnish [illegible]
[illegible]

colours

[illegible]

[illegible] Experimentum Crucis. Being that which he hit out of the difficulties into which the Great Mismanagers had run, as plainly shewed a different degree of refraction & a different colour corresponding thereto in the rays. Which that [illegible] Rays [illegible] to be green ones more than yellow ones & blue & violet ones most of all.

[illegible] those that have a white will be whitest, those refracted for the red ones red & colours [illegible] & so much then are the more obtuse [illegible] & the more easily reflected & consequently [illegible] bodies only appear of his or that colour which their surfaces are disposed to reflect: or at least more abundantly than any other.

[illegible] Lancelot which if they be placed [illegible] each other so that there happen no [illegible]

in their interstices, there so is become transparent
but if their interstices be so large & those filled with
such matter as is simple & equal to the part of the Glass
so that there happens a number of Reflections & refractions
within the Body the Body in that case becomes opake.

The Rays which are not reflected from a opake body
penetrate into it & there suffering innumerable reflections
& refractions at length unite themselves to the particles of
the body itself.

Why a black Cloth grows hot in the sun.

Hence an opake body grows hot the sooner as it reflects
less light for obvious reason we see why a white hot, which
reflects almost all the rays that strike upon it heats much
more slowly than a black one, which reflects scarce any
if no Rays the one perfectly Dry, the other Wet
Cloth both pretty deeply with this difference & remarkable
a piece of white Cloth will exhibit a double red and the
one red & the other blue: in regard the red & purple colour
rays are separated & lie unequally refracted.

Why Colours appear so different in different Lights

Colours at all Colours or rather to speak more properly
are this mutual Decussation, that is every one distinct
ray being reflected from an Object has a peculiar
Degree of red, in a small Degree reflected. The reason is
that colours are not the effection arising from refraction
or reflection, but are the properties such as belong
to the nature of the Ray.

The green, yellow & [illegible] violet Colour being [illegible] in a certain proportion appear whitish i.e. are of such a Colour as arises from white & black mixed. & if there were not some Rays absorbed & lost would be plainly white. if a Paper as big as a Circle be painted with each of these Colours separately in a certain proportion & then swiftly turned round its centre, the motion of the paper will mingle the Colours in the Eye & the whole paper will appear of a Colour between black & white.

The reason why liquors appear of different Colours in a conical vessel in different parts of the glass is that the rays are more & more intercepted by them as they pass a longer or a shorter section of a vessel.

Light how propag.

Sir I. Newton supposes all hypotheses to be precarious in which light is supposed to consist in pression or motion. if it consisted in pression propagated without actual motion, it would not be able to heat & agitate the bodies which refract & reflect it, & if it were a motion propagated to all distances in an instant it would require an infinite force every moment in every shining particle to generate that motion & if it consisted in pression or motion propagated either in an instant or in time it would bend into the shadow. for [illegible] of a fluid arising from opposite sides [illegible] with equal force. the waves on stagnating water passing by the sides of a broad obstacle which stops part of them bend afterwards & dilate themselves gradually into the quiet water behind the obstacle. so also the vibrations of the air tho' not so much as the waves of water for a bell may be heard beyond a hill which intercepts the sight of the sounding body. but light is never known to follow crooked passages nor bend into the shadow. for the fixt Stars by the interposition of any of the Planets cease to be seen. the rays which pass very near to the edges of any body are bent a little by the action of the body [illegible]

Colours

in bodies objects are only a certain texture of parts proper for directing some particular [illegible] to the eye and one not agreeable to it it there needs nothing but a new texture for presenting the Eyes with a new color. Such a particular polisher is power to make a lighter when white is.

A white Body is a texture of soft & spherical parts such like, the soft absorb the least rays the spherical such like reflect the rays more briskly. A man with white is seen the more lightsome, because the Sun reflects the soft & spherical particles of the surface into the Eyes in a greater number. Why is the foam of water white & seen but it self, because the small rays where it is too much are formed into globules or at least into Triangles for the same reason powder glass becomes white. Silver plates are whiter in hot water, improved with Tartarus salt & salt of Tartar; because there salts which cram the surface of the silver make there a much shapes which reflect the light from it without absorbing any or at least very few of the rays. On the contrary the colour of silver is dark when it is polished. The Reason is because the globules or triangles of its surface are made fewer. Glass does therefore grow whiter in running when the heat dissolves the fixed salts & makes it reflects a greater

[illegible] of the [illegible] of [illegible] [illegible] [illegible]

a Legion Consisted of six thousand ~~men~~ feet after the reception of the Latins into Rome. the Common number in the times of the Sam. Wat. and 4000. they under afterwards in the war with Hannibal were reduced to 3000. Sev after was 5000 or 4,200. the horse required to each legion was 300 divided into ten Turmæ 30 in Each.

Leg. ta. A Legate was constitution the Prætor general with us.

Light. Light at the rate of 7½ miles or 40 leagues in a min. from the Sun. Sun is reckoned to be 20,500 leagues in a second of time. it from this it is plain, at its first discharge from the mouth of a Cannon, yet one mile in a little above 8½ seconds & therefore must be 32½ years in arriving to the sun. hence it is plain that light flies 3112 times faster than a Bullet at its first discharge.

Lightning Lightning is thus occasioned: the air with stand with the strains & exhalations of sulphur Bitumen, nitre, salt of various sorts kind & Metals, these being raised by the sun's heat into the higher regions of air are there dispersed & ventilated by & fro by winds. this agitation produces a mixture, & consequently a fermentation of these combustible sulphurs with the nitrous acids, which is often to that degree as to kindle into flame the thunder is produced hence as the crack of gunpowder or fulminations & the reason we do not hear the crack sooner than see the fire, is because the sound is slower in arriving at our Ears, than light to our Eyes. what is called a thunderbolt is nothing but a more stiff & more tenacious

which flies through everything that stands in its way. It generally affects the highest places. Its strange effects the philosopher can but conjecture at, imputing it to the different figures & qualities of the particles of lightning which whether it repels or disturbs some substances at the same time that it melts & fetch others.

When a fat unctious vapour is kindled & wafted about by the motions of the air, near the surface of the earth then light in a lantern we call it an ignis fatuus.

Lodi This Lodi is a strong & populous city of Italy in the Milanese & an subject to the King of Spain remarkable for its cheeses which are call parmesan, for reason that a princess of parma, as the story goes, first brought it into France.

Latitude The latitude of a place on the earthly globe, is the distance of the zenith of that place, from the equinoctial either north or south measured in the degrees of the meridian.

The declination of the sun or any star is the same as latitude on the earthly globe.

The latitude of a star is its distance north or south from the ecliptick.

Altitude The altitude of the sun or star is its distance above the horizon measured on the quadrant of altitudes.

Original difference

is the time of the sun or stars rising or setting before or after six a clock —

Longitude

The Longitude of a place is the distance of it towards the east or west from the first meridian & is measured on the Equator.

The Right ascension of the sun is its distance from that meridian which cuts the Point aries measured eastward on the Equator, is much the same with longitude on the earthly globe.

The Longitude of the sun or star, is its distance, from the point aries eastward measured on the ecliptic but with regard to the sun or planet, is usually called the place of the sun or planet for any particular day.

Leaves their use

The leaves are highly respected & were by the Indians, Juices were brought to perfection by circulating through leaves, leaves serve to defend the tender fruit from the injuries of the air. Accordingly when we see the leaves decay the leaves we see the fruit begin to ripen & ripe fruit. Gauss says: Oct 30 1759.

Tides are, water, as elevated is salubrious from the moon & the earth is so in the upper region, the Pole unites them & with his power they are not

[illegible] projected, but because they are sustained by
the [illegible] of the winds or the [illegible] altogether
[illegible] [illegible] [illegible] [illegible], [illegible] [illegible]
[illegible] of [illegible] in proportion [illegible] [illegible]

Opening [illegible] whence the successive flashes proceed.

[illegible] [illegible] raised in the Inflammation as the
Clouders [illegible] [illegible] & may be in equilibrium
with the fine air which surrounds them. this
being granted they may then not be inflamed at
several times? after inflammation tho' they be more
[illegible] yet are they still in equilibrium with the
air in which they float. consequently they may [illegible]
[illegible] to be [illegible]. the spring of the air being
[illegible] in the Inflammation, & [illegible] again
they [illegible] one another again, & the [illegible]
their encounter one another as before, hence seem
to proceed the repeated flashes. [illegible] p. 125

Light how diffused according to Sr I. Newton [illegible]
Ling Lat=leip.

Louse see [illegible]

[illegible] what probably [illegible] of see p. 28.
[illegible] a [illegible] v. p. 44.
[illegible] p. 26. [illegible] of barren, ones p. 64.

[illegible]

[illegible]

[illegible]

Mange

a Cure for it. Take a ounce of Stinking Brimstone & half an ounce of antimony mixt them together & give the dog as much as will lye upon a shilling in a Piece of Butter which must be repeated every morning till the Whole is used.

the Moon

The Moon is about 30 times less than the Earth, & about 238,920 English miles distant from it. it moveth about the Earth in about 27 days 7 hours & 43 minutes, & about her own axis just in the same time.

There is a surprising deal of contrivance in the formation of her hinge which joins the upper & lower shell of a muscle as this is the instrument of powerful movements of these little animals fibers & ligaments with which it is fastened. when it has a mind to shut itself then upon in its naked shell, it discharges a certain liquor into those little muscles which causes them to dilate & swell & consequently shortens their length & brings both the shells together which both the extremities are fastened together. when it has a mind to open & withdrawing that liquor it relaxes the fibers & consequently lengthens

Muscle the manner of its opening & shutting its shell.

Nature Displayed Vol. 2

Lecture Sixth

[illegible]

M N O P Q R S T U V W

[illegible] water there of [illegible]

[illegible] a [illegible] piece of [illegible] and [illegible] [illegible] in form of a triangle but [illegible] [illegible] [illegible] of [illegible] [illegible] [illegible] [illegible]

[illegible] it before [illegible] after this the [illegible] [illegible] [illegible] it on the ground with [illegible] it in two pieces [illegible] Boyle [illegible] [illegible]

marbled paper

Marbled paper is made by touching the surface of a [illegible] full of water [illegible] the [illegible] are [illegible] [illegible] [illegible] [illegible] colours.

metals

The Reason they lengthen by a Wire drawing from under a hammer is because their long & narrow parts run over one another without quitting their [illegible] with [illegible] & Earth is water a species of [illegible] Iron. Steel is only refined Iron. See S 184 vol 1st of Dales Phys.

[illegible] waters see springs.

[illegible] Convex represent objects smaller than they are. The [illegible] effects of these Mirrors causes the effectual rays to be reflected to the Eye [illegible] a very small surface.

Dales Phy: vol: 2 1356.

[illegible] see Plants.

Meteors

see in 8 next [illegible] by mistake

Moldew

If the moon had a sensible atmosphere we should perceive some change in a fixed star or planet that approached so near to the disc of the moon & visibly touched it. the passage of the rays through such an atmosphere & their refraction would change the situation & appearance of the star, which no one has yet perceived.

Green no atmosphere

Dales Physicals [illegible]

Mineral Waters

They best account for the heat of some of these who supposes that two streams [illegible] & imbibed several sorts of different minerals [illegible] & mingle their liquors, from which arises a great fermentation that causes heat as [illegible] see in Vitriol & Tartar, which [illegible] cause an intense heat & ebullition. [illegible]

Observations

1. Flowers have figures to mark their sexes. p. 12
2. in a Foxglove the pistil never appears [illegible] the stamens [illegible] but [illegible] prominent or that anthers [illegible]
3. the Tyrtis & nettle observable in a tree. p.
4. the butterfly has a spiral tuck which [illegible] pleasure [illegible] not to be [illegible] to his legs. p. 12
5. a frog's head is off his heart may [illegible]
6. the Field spiders [illegible] are [illegible]
7. Flies may be observed [illegible] them to [illegible] as their life departs.
8. Grasshoppers have a green plate over their neck & shoulders [illegible] see the heart beat. p. 24.

NOPQ

9 [illegible] p. 4. P 20

10 [illegible] may be seen by [illegible] in water & the [illegible] of the heart & taking its [illegible] P. 30.

11 The Lamprey has a hole at the back of his head through which he spouts the water he sucks in through [illegible] on each side its head besides which its heart is incrusted in a cartilage or gristle to preserve it (as it has no bones) from Injuries. P 40.

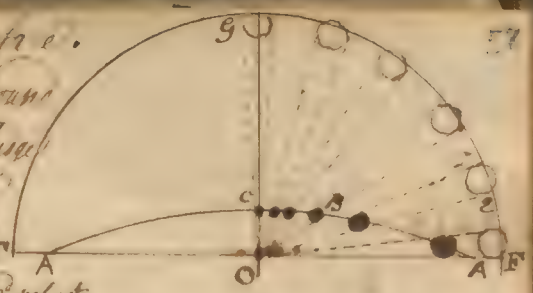
12 The seed of strawberries may be observed on their outsides. P 48. Look at the Leaves of sweetbrier, English mercury, or [illegible] leaves of Rue & Sage. P. 50. like Buckthorn P. 52.

13. By compression of the nerves the propagation of the animal spirits are hindred: when motion is restored you may feel something creeping into the member tingling & stinging which is only the return of the animal spirits into that part. see P. 64 & [illegible] microscopical observations see Dr Power's microscopical observat. [illegible]

moon 2 [illegible] explanation [illegible] horizontal

That all objects beyond a certain distance in the heavens appear as in the same segment of a circle the sun moon & stars sufficiently testify. this segment by a quadrant from several observations is found to be 3 or 4 times greater near the earth than over head. so that any apparent magnitude of an object is measured by the angle which the 2 rays coming from the extremity of the object make: the moon must consequently appear larger as seemingly when it appears to be near the visible earth than in any other position. as will sufficiently appear by the [illegible] AA the apparent situation of the Moon which must always [illegible] to the [illegible] described by the black spots in the [illegible] because we judge all objects in the heavens

to be placed on the surface.



as on earth by the quantity of grains so in the heavens unerringly judge of the distance of objects by the quantity of air that seems to be between them. Smith's optics. §683 vol. 1st.

The Reason most Clouds seem to be of the same height except very near the surface of the Earth or driven by violent or contrary winds is because there is no visible substance between them we have nothing whereby to judge of their distances. Smith's Opt.

The bit of wire will not be able to see a white line upon a black ground or a black one on a white ground when it subtends a 30 angle at the Eye. Hence a wire or which is the same when its distance from the Eye exceeds 515 times its own diameter. [illegible]

Moses. Shells plants fish & animals have [illegible]

Metals & Rocks [illegible]

Moth. v. §. 54.

Minerals have a kind of life. v. §. 28.

Mushroom. v. §. 32.

[illegible] v. §. 34.

[illegible] v. §. 35.

a definition of nature

Nature is the Constant & uniform operation of the Divine Being thro' all the parts of the material World. Conybeare's ser: on the possibility nature & certainty of mira

Nettle

You may see in the middle of the hard point of the stings prickles of a nettle a small hole through which a sharp & venomous liquor contained in the base of the prickles runs into the part pricked & causes a pain there by gnawing & tearing the fibres. Phil. Tr. abr.

Nature 1st Principles

~~[illegible]~~ Sir Isaac Newton's explication of them. It seems probable to me that God in the beginning formed matter in solid, massy, hard, impenetrable moveable particles of such sizes figures & with such other properties & in such proportion to space as most conduced to the end for which he formed them; & that these primitive particles being solids are incomparably harder than any porous bodies compounded of them; even so very hard as never to wear or break in pieces: no ordinary power being able to divide what God himself made one in the first creation. While the particles continue entire they may compose bodies of one & the same nature & texture in all ages: but should they wear away or break in pieces the nature of things depending on them would be changed. Water & Earth composed of old worn particles & [illegible]

N
O
P
Q

of particles, would not be of the same nature & texture now, with water & earth composed of entire particles in the beginning & therefore, that nature may be lasting, the changes of corporeal things are to be placed only in the various separations & new associations & motions of these permanent particles; compound bodies being apt to break not in the midst of solid particles, but where those particles are laid together & only touch in a few points. [illegible] 94.

[illegible] Q. 31

Opacity see pages [illegible] at the [illegible] of the book. 46

Dyal. To take the salt out of it.

Take a piece of Lead [illegible] grave some of it in a fine powder put it into the Pot & it will precipitate the salt [illegible].

Orange Here's a new way of grafting from v. 86 p.

Dyal To make Dials [illegible] [illegible]

70

Pretexta a Robe Edged with Scarlet which Children of Quality wore till seventeen year of age.

Parmesan see Lobidi.

artificial pearl as made with the scales of the bleak, which is made into a sort of varnish, which being artificiall lays on beads of wax or glass makes them look exactly like pearls. —

Pearl artificial how made

Phosphorus how made

Evaporate upon a gentle fire what quantity you will of fresh urine, till their remain a black substance almost dry. let this rest for three or four months in a Cellar then mixit with double the quantity of Pot ashes, put the mixture on a gentle fire in a strong Retort with a recipient till three halfs of water. raise the fire to Ignes for three hours & there will pass into the recipient first a little Phlegm then a Volatile spirit then a great deal of black stinking oil & at last the substance of the Phosphorus will remain sticking to the in a white mass which you must melt in water to reduce it to a Roll which you may keep several years in a Vial full of water close stopp'd.

see Boles su[illegible] kind of Phosphorus shines in the dark

P

Phosphorus
how to make it.

Take of the Bolonian stone five or six great stones pound two of them in a mortar to a very fine powder to which that make a cover round the other four, then put all in a little furnace get a grate cover them with coal & continue the fire for three or four hours this done take out the stones & clear them & your work is done.

Romans Inst.

Pontoons

Pontoons are copper boats made for passing an army over a river, the reason they have such weight is because the air they contain is little in proportion to the water they displace when they possess.

Pendulum
how made to
[illegible]

A string little less than 10 inches from the point of its suspension to the centre of the [illegible] [illegible] differences with [illegible] [illegible] for half a hour this [illegible]

Preserving
with salt
or
brandy.

Salts preserve fruits as common salt meats. in being put in the form of pickle. the pure consistance to the parts which contain them, hinder the fine particles of the liquor from dividing those of the solid body or the spring of the external air from breaking them.

the Branches forced carry the parts of the sugar into an Infinity of pores & sinks them like sotnani wedges not able to extricate themselves) either penetrates too easily or does not sufficiently penetrate certain Bodies so as to damage them. Dales Phys: Exp: p. 266.

see at the end of the book page 50th

Precipitations accounted for

Fertility is the cause of the Malaties of some plants giving too much juice to their fruit they cast prematurely for nourishing themselves & [illegible] or fruit are of less duration than others.

Incisions are hurtful, as seen most in pruning one cuts the roots or strip them of their bark or otherwise break the root so that no more remain but the bark, cause in that case the sap can no longer receive nourishment into the different parts of the plant.

Frost which dilates the fibres as it dilates water in freezes as it breaks bars & rends the fibres of plants leaves the fibres sometimes shivers them.

Heat inwardly rarifies the fibres & alternately opens the pores of plants & proves the juice out of them by the excess of rarefaction. [illegible]

Plants malaties of them.

[illegible] of [illegible] [illegible] which eat their [illegible]
[illegible] [illegible] [illegible] is sufficient to preserve them. Beans

Plants how to preserve them. them will [illegible] [illegible] insects, [illegible] [illegible] they [illegible] [illegible] [illegible]. boil in a pail of water, for half an hour, rue wormwood & Tobacco a handful of each, & stir the water & water the plants thereof four times with it given in [illegible], this is enough to secure them from [illegible] & black flies. an [illegible] floor being washed with water, in which one has mixed Corrosive Sublimate is [illegible] to certain worms, which otherwise would eat into it. Hales Phy: vol 2 308.

Planets Because the motion of the planet is retarded as it recedes from the sun, & is accelerated as it approaches to the sun the Planet always describes equal areas in equal times. see notes on Hales Phy: p 302 vol: 1
Clark Rohau vol:2 P 74

[illegible] see the [illegible] from [illegible] at the end of the book.

Prism see Colours.

[illegible] [illegible] [illegible] [illegible] water [illegible] see [illegible] of it

Petrifying [illegible] may be accounted for thus. 'tis reasonable to suppose, that the water sliding down the sides of soft stone, loosens the minutest of its particles, & is impregnated with them, which are again separated from that water by putting sticks of wood into it by the power of attract

as we see some kinds of salt separated from water
by the like means. now when these particles are
so minute & subtile, as to be made with the heat
into the pores of wood, in process of time, when it
is brought & baked, the interstices will be quite
filled with those particles: & if anything aqueous
remain it is so well quarred & incrustated with
particles that it is not perceptible, nor to be act
upon by fire: but if the particles are not so minute
as to penetrate the bores of the wood, they will not
close to the pitt side of it & exact it tree. here we
may gather the reasons why fountains petrify some
sort of wood throughout & not others: & why some
petrify the bark sap or softer parts, but leave it
the causes of their separation & bars remain in p. 30.
water how to prepare it p. 63.

Dissolves
Copper

Open: Fo: 3:6.

nutritive of juices are [illegible]. The plants without any power or [illegible] down to their roots & vanquish.

Hail bruises the fibers of the leaves & extravasates the nutritious juices. Rain with hail softens the fibers renders them more flexible, & consequently fitter to escape the violence of the hail by [illegible]

Dalis Ag: Ess: 49.

The parasitical Plants are often metters [illegible] by the tipping of Insects. Those are those which live only at the top of others as the Dogs & Lichens for the [illegible] & their roots are frozen into the bark of the [illegible] out of them & take them of their sap for their own nourishment & that makes a thin & dry nutrition. The roots of the Lichens are growing small & the vessels carry them already upon walls, roofs & trees where being naturally exposed they grow up.

Insectes sometimes diminish the sap of juices, for a remedy the more the earth which covers the roots, [illegible] it more air by moving it & therefore cover it with dung. A proper manure of juices penetrates to the roots, [illegible] the waters to [illegible] proportion of it rising to its that [illegible] have the effect of the snakes.

[illegible] Leaves [illegible] or [illegible] [illegible] a [illegible]
life, pass their boundary & then wash them with clear water, which
[illegible] of the [illegible] of [illegible]
when a lot of slime relaxes the fibers, & causes obstruction
the [illegible] of making the leaves fall off, water & [illegible] dry
[illegible] fermentation & putrid juice which [illegible] the
fibers rather than to their former strength & vigour the
evil.

If some Gaseous Juices rise or flow or Image
Trees from leaves or flowers during, & have their Birth
in autumn with the Earth which covers the roots of
these Plants & form Juices more fluid & fashion the Leaves
& Fruit. Dales Phy: vol: 3d P: 51.

Plants

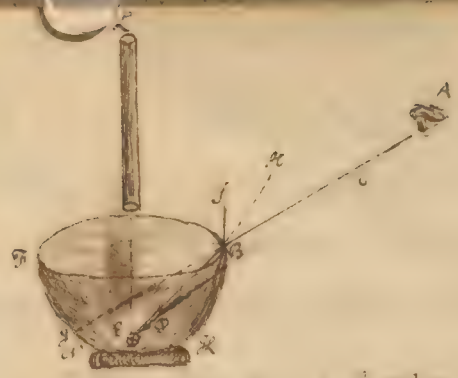
The leaves the Convolvulus shut in the night while the
leaves of Sorrel is blown open from the different
Excentricities of Leaves. If right lines are Pipes low
flexible, & as it were automatic Bodies, they will
bend in the night some straight upon the Leaves
or Stems. The Sun will on [illegible] those Leaves in the
morning the opposite sides of the flower will be down
[illegible] in the spring [illegible]
in the routine. In a contrary disposition of the Tubes
the Convolvulus will shut in the night & open in the
Day. Dales Phy: vol: 3d P: 63.

[illegible] the [illegible] of their [illegible] from the [illegible] Leaves & Stems

[illegible] pt. of t. [illegible] breast.

[illegible] pains in the breast

Take of nard [illegible] as much as [illegible] from which spread to the [illegible] and soon give relief.



Lay a Shilling E in an Empty vessel it is so that one that stands at A may be just hindred from seeing it by the Brim of the vessel B, then pouring the shilling never water into the vessel as high as T B by which he that stands at A will then perceive it very clearly as if it was at g. this is caused by the Refraction or bending of the Ray B E which instead of running directly to H makes the angle E B A & so reaches the Eye A. from hence it appears that a Ray E B is refracted in Passing from a denser body into a rarer as from Water into air & that it doth not run directly from E to H but to A & so is somewhat inflected from the Perpendicular line J. if any falling Perpendicularly on one Transparent medium to an other suffers no refraction as the aforementioned Ray did which came upon originally. if you look on the shilling E through a narrow & perpendicular tube L whilst the Pieces E lyes in an Empty Vessel directly under it, though you fill the vessel the shilling will seem just the same as it did before

Rain ordinarily proceeds from the watery Vapours Exhaled out of the sea from the Sun & earth which when they are mixed or condensed by the Distillation of the Air into their proper Substance of water which is much heavier than Air, much of it would fall, indeed it would in great quantities were it not for the resistance of the Mighty Volume of the air beneath. it grows smaller & smaller the farther it falls from its Fountain. this is

Rain

[illegible] the sun shines before the rain makes we call snow
if not till after it rains it and then it hail.

[illegible] falling Rain or Drops not
in the Blood silence that rain of Drops [illegible]
[illegible] refraction of the [illegible]
[illegible] parcels of Rain [illegible]
[illegible] the [illegible]
which is more strong & [illegible] the [illegible]
[illegible] which is more faint &
[illegible] is
formed by two refractions

[illegible] reflection of them in the [illegible]
let E F be two drops of the falling Rain & let [illegible]
[illegible] falling in the drop E in a, from whence it is re[illegible]
first to e thence in[illegible] reflected to E, where it is [illegible]
[illegible] to the eye at O in the same
[illegible] appears in the upper part of the bow in the
drop F. hence you may easily see the reason of
the colours of the bow, for here you see [illegible]
shall be the greatest angles in which the [illegible]
[illegible] refracted to the eye
[illegible] the drops in the line O. shall send the
[illegible] Rays most copiously to the eye, & [illegible]
[illegible] sences with the deepest & the colours in that [illegible]
in the [illegible] the angle [illegible] shall be the smallest in

[illegible] Red in that Region. martinski: gram: 1175

for the [illegible]

[illegible] in a glass of ale five or three times a day.

Rattle snake

[illegible] the smell of Rattlesnake see Rattlesnake

Rainbow

[illegible] the reason the Iris has the figure of an Arch is because all the rays of the rainbow are almost equally distant from the Axis of vision. the reason why the rainbow is always a circle is because [illegible] in their direction parallel above or below the eye [illegible] not seen. the rays of the sun enter into the drops of the [illegible] the upper part of the sun has [illegible] of colours which represent the colours of the Iris [illegible] their colour. [illegible] see the Rainbow [illegible] at the lowest time from the top & bottom of the [illegible]

Rope a remarkable

a Rope twisted by nature is the Pickertree in China [illegible] the ground 100 Paces about [illegible] which [illegible] for Cables [illegible] & [illegible] other uses. see Phil trans: Vol: 2. towards the End.

Springs — as the causes of which men are of various opinions some imagine great caverns in the earth, which being very cold, condense the air into drops of water, & those being collected make a spring. others are of opinion they arise from the great abyss mentioned in the scriptures. there seemes indeed to be water in all or most parts within the earth but not at every place at an equal depth. most men think that all springs proceed from the sea water dulcified by percolation thro the gravel or other convenient passages of the earth. it is not easy to imagine how the sea water should rise to the tops of mountains, yet even there are ~~often~~ found sea plants often growing which perswade many of the truth of that opinion. others think that the water which furnishes springs is that of rain & snow which in clouds hanging over the hills furnish them cheifly with moisture. see more of this in the introduction to the atlas page 1st 2d printed in 1830

Sky. — The azure colour of the sky Sr Isack Newton attributes to vapours ~~of~~ grossness to condense, & that are not able to reach the other colours. Inst. 12

Socinians — a sect so called from one Lelius Socinus. afterwards promoted by Faustus Socinus at Jena 1555 he asserted that Christ was mere man, & had no Existance before Mary. Denied the Personality of the Holy Ghost, Original sin, Grace, Predestination the Sacraments & Immensity of God.

Spiridon — A Body of Horse from 150 to 200 men.

Servant. — if a servant was discovered in a Brothel of Roman Tiberius he was presently thrown headlong from the Tarpeian Rock.

that not all the fixed stars have a motion but is sure
perceivable as not exceeding one degree in 70 years, & that
to compleat one Revolution of the Circle is required
25920 years after this all the stars return to their
former places. this period of time they call formerly
the Platonick year. the number of these is probable
is next to Infinite; for with a good Telescope they appear
millions beyond millions, tho' by their distance they
escape the sight by the best Instruments. So their
smallness of their appearances through the best glasses, & the
different degrees thereof, the Astronomers, Imagine
that not only as far distant from Each other as
from our sun. but also that Each fixed star is a sun
surrounded by a System of Planets & Comets, &
these again furnished with different numbers of moons
like those in our own Solar system. this Hypothesis depends
on divers astronomical observations: we may also reason
thus: our sun shineth by its own native light, so do these stars
ergo. they are suns: the sun at the distance of a fixed star
would appear no larger than a star ergo &c. none of our planets
at that distance would be seen at all; ergo &c Nothing is made
in vain.

Stars the fixed ones

We know how stars appear & disappear after certain
intervals; what can this be, but the Almightyes hand giving
life, & erecting new systems of worlds. such an Instance was
the case of our world, & planetary system, in the Messiah creation

our sun just rise, would have been a new point that
just appearing to an Eye in one of the nearest fixed
stars of our system, the moment appear, new stars, when
in their aphelia, but in their return to their perihelia,
disappear again: thus also some of our fixed stars may
be so disposed as to be points belonging to some comet in their
utmost recessions which upon their return disappear
again: these new & extinguished stars, are generally in
the milky way, because there parts are replenished
with a far greater number of suns, & therefore have a
cause, more frequent occasions of these phenomena.

Springs from what cause or in what manner they arise

Some people imagine that springs arise from the
sea water which leaves its salts in the sands through
by draining through them, & then percolating through
pores of the earth, is raised by degrees to the top
of it by some certain power of attraction & that for
sand & other terrestial matter has a power of attracting
water, appears to be very certain from putting a lump
of sugar into a little water, through the pores of
which the water will quickly ascend to it top, or
what is still more to the purpose a little water poured
at the bottom of a sand-heap will ascend into the mid-
le or perhaps near the top of the heap, this
seems a just representation of what the ancients
fountains are, with regard to each other. this

indeed the most plausible objection that can be started against their true cause. but to this it is answered that in the first place, neither the sun nor the earth have that attractive virtue which we might imagine them to have; for the causes of the waters rising in them is owing to the extreme pressure of the air, which forces it up in some bodies, in which the proper part of the air does not act with its power. but this elevation of water is only to a certain height; for it has been found by frequent experiments made in Germany & Italy, that the sun or earth will draw, in water, that the water in some rises to the height of fifteen, in others to the height of 32 feet & never higher, so that which is thought of most mountains there is little or no proportion. besides the sea never flows up its own passage, through the land & the earth by a sort of [illegible] sufficiency that comes to be [illegible] of it. see more of this in ye 3rd of nat. Disp.

the ex-
[illegible]

First the smaller particles of sea salt are exhaled together with the vapours, carried all over the earth by the winds & become one of the principles of vegetation. secondly these grains of sea salt that are more gross & heavy resist the action of the sun & air in rarifying the waters & thereby fix the measure of evaporation, for the particles of the salt & water

ring Heat & incorporated with each other, are
neither so easily nor so quickly separate; & the more
these saline particles are that element the rarifying
power of heat & the air, the fewer aqueous par-
ticles are raised by them in vapours: it is the salt nitre
pre: which, by making the water specifically heavier,
discourages the growth of exhalations & vapours, & con-
quently we are obliged for that just proportion of
fresh water which the sun raises to evaporate
from the sea for our use; for were it not for the
resistance it meets with from those particles of salt,
it would raise from the sea a quantity of vapours
sufficient to drown the Earth, instead of making
it fruitful.

In what
the manner
the water
rises.

As the air causes our clouds to rise upwards by
descending directly through them from the north to the
south, the water on the other hand causes the tops
& other sea plants, to grow in a contrary direction,
down from the vault of heaven through its pores
to the root. it seems a wise contrivance that
the plants can be nourished & grow without the
assistance of the Earth, for they do not all have
a root but a flat bottom by which they stick on
some shell or piece of wood, but this objection is
easily answered, for we consider that as our land
plants are made to grow on those places which most agree

the pores of the Earth, or fluctuate in the atmosphere, they are accordingly provided with [illegible] to attract the [illegible] water under ground & also with [illegible] vessels to receive the moisture that is in the air. [illegible] with some other [illegible] a sufficient quantity of air, [illegible] as have necessary for their respiration, have no occasion for roots to feed them with a supply of juices from under the ground. [illegible]

See Flowers.

We may infer from roots cracking in the pores that it contains bubbles of air, which being rarified by the heat burst their cells & give a crack. Now as this air in our bodies is a principle of motion, it does consequently help digestion better. Bat. Ess: vol: 3 p. 261.

Fact the cause of roots cracking in the pores.

System Copernicus.

Pythagoras is said to have been the first Inventor of the System which was revived about the beginning of the fifteenth Century by Copernicus a Canon of Pavania & on that account called by his name.

Not known.

The attraction of water is not only [illegible] from [illegible] system [illegible] Quicksilver [illegible] as metals by near removed

to Fluction, this is manifest from the making of Shot.
The way of doing which is by running the melted
lead through a ladle full of holes into the water. in
doing which they take care their lead be not too hot
because the globules would then be in pieces; nor too
cold, because it would then be long & have tails.
but in a due Temper it runs round. they [illegible]
into it when they melt & prepare it for it [illegible]
see colours. calcinate & give see what the end of [illegible]
see colours.

Sublimates. Salt spirit of it

If they burn off with them salts first [illegible]
fit for fermenting, an together they heat in the
fermentation. If they are cold above not [illegible]
fine & vaitates parts are easily exposed in the
air & those of the bottom being stopped by the [illegible]
parts with their pores against that means [illegible]
that exhalation which is the cause of heat. If
they are cold in the Day & hot at night it [illegible]
proceeds from the heat of the day [illegible]
rarefying the vapours & exhalations [illegible]
separating them so much as [illegible]
[illegible]

Springs mineral owes the cause of them.

[illegible] of the right Conceptions [illegible]
them & put them into [illegible]

of sence with a sufficient violence to cause in them a sensation of heat. if they encounter in their course with places full of sulphur or bitumen they abound with more spirit which rises & lower over the surface of the fountain which was very easily kindled by the flame of a candle if these waters being carried to another place do not catch fire it is cause the sulphurous part is soonest dissipated by the motion of the carriage. Sir Ch: vol: 2 p 124

Scorpion Mercurius mo sec 8. 5.

the cause of their heat see 38 mineral waters.

Sea fish sec 9: 39.

[illegible] a great [illegible] of [illegible] with or [illegible] them. [illegible] which [illegible] their [illegible] to sleep; & opium which [illegible] their motion by the [illegible] of its parts, procures the same effect if the [illegible] strong [illegible] makes because it extinguishes the heat of the blood & in consequence that of the spirits. sleep often comes upon a meal.

Sleep

the blood being thickened by new chyle, which is not yet sufficiently digested, and so [illegible] furnishes the brain with animal spirits, or those it does furnish are too gross to flow into the organs of the senses. [illegible] is [illegible] the

[illegible] the flow of the
spirits never [illegible] more [illegible]
[illegible]. but [illegible] are [illegible] without [illegible] their
[illegible] which [illegible] with [illegible] & prepare [illegible]
[illegible] the [illegible] of the spirits but [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] is a kind of [illegible] caused in the [illegible] of the
spirits which are [illegible] [illegible] which [illegible]
passages [illegible] [illegible] [illegible] and [illegible]
[illegible] of sence.

Fumes of wine, spirit of wine &
certain perfumes cause sleep for the [illegible] of
the [illegible] in the [illegible] [illegible] [illegible]
[illegible]. the dilatation of the [illegible] [illegible] [illegible]
[illegible] & filles of the spirits. [illegible] [illegible]
[illegible] [illegible] [illegible] humour [illegible] into them
fermentation [illegible] them up. [illegible]
The [illegible] of a [illegible] causes sleep [illegible]
attracting the attention & the [illegible] [illegible]
[illegible] the motion of the spirits [illegible] there are
so many [illegible] or varieties of [illegible]. the [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] there are so many animal spirits which [illegible] other nerves Extra

to give a due firmness to the members of the body.

Sleep make men stop because the spirits hurry [illegible] P. 10
[illegible] and become [illegible].

Swallows | why they sleep the winter. see Page [illegible]

Sounds | of [illegible] kind are more or less strong according as the reflection is more or less [illegible].

Sensitive Plant see Page [illegible] & more fully P. 36th

Water | to raise one in [illegible] hours see Page [illegible]
Thunder | reason battle accounted for P. [illegible].
Stones | many qualities of them explained see P. 22 [illegible]
Water | why it does not freeze as soon as fresh. & why it seems
warmer | flinches in a storm at night. see water.
Sugar salt &c. | seem to be accounted for from the
water attraction between the particles of the sugar &c
Sugar &c. | & water than between the particles of sugar & sugar.

see Miscellaneous & P. [illegible] 52.

[illegible] 6th [illegible] | [illegible]

[illegible] | [illegible]

How caused. | of kind whenever they lighton a proper matrix. [illegible] seeds of mosses mushrooms
13th | [illegible]
Animalcules | & seed to surround it & which atmosphere [illegible] will [illegible]
[illegible] | [illegible] in all places. Virgin earth becomes fertile & crops or new plants
[illegible] | very soon shew themselves. all which proves of air to be a common receptacle
[illegible] | for all vivifying principles.
[illegible] how | [illegible]
[illegible] | [illegible] of particles compressed & under Elasticity.

Jonas

was the a[illegible] of our Revenues for it was
his Care to see them kept in exercise & well disciplined
& to defend the Coast for Orders he was a general.

It is now growed known that the tides are caused by
the attraction of the moon, & sometimes encreased by
the attraction of the sun together with, as in
conjunctions or newmoons, & these we call spring tides
sometimes the suns attraction acts counter to the moons
as in the quadratures & then the tides are lessened &
are called neap tides. which may be illustrated
in this manner. suppose a ball surrounded by
water p q n, m the moon in conjunction with, & o in
opposition to the sun in s, & in the quadratures
from the sun in q: now it is plain the part
of the Ocean q, to which the moon
is perpendicular, will ascitate to the moon more than
any other parts of the Hemisphere s q n & therefore the
water in that part will become higher than usual, &
so will tumble & rise up to meet the moon. on the
contrary the water in N, being farthest from the moon
will be less attracted & gravitate less towards the
moon and other parts of the land in the hemisphere
s N n: & therefore will keep at furthest distance from the
moon, or, which is the same thing it becomes higher than
usual, & tumbles on the part N towards the moon.
[illegible] to an equal figure when direct in q N & s
[illegible] & n, they [illegible] the tides at q & N are existant at
[illegible] that it is evident that

Does the manner of their ebbing & flowing

following the daily course of the moon that they
must continually succeed each other under every
Meridian at the distance of 12 hours time &
therefore must each rise & set twice a day.
when the sun & moon are in conjunction the waters
of ☉ & ☽ will be attracted by those powers jointly
when the moon is in quadrate to the sun, that is when
these luminaries are in ☊ & ☋ then the power of
the sun in ☊ acts contrary to that of the moon in
some Philosophers maintain that the moon is of
not so great force this effect is by varying
the atmosphere which lies between it & the sun
& that the body of the air by its elastic power dis-
posing to expand itself, presses upon the waters
& by the force of that impression makes it rise
upon the land. others deny that the power of
the moon, by the mediation of the atmosphere
has any share in producing this effect but some
it is the power of gravitation, or a tendency
the earth & waters to approach nearer the moon.
[illegible]
[illegible] to a fine powder [illegible]
crystallizes into a flower like [illegible]
into cold water.
Tartar see colours. All tartar is an acid salt drawn from tartar
tartar is the lees of wine, according to the internal nature of

Tickling whence it proceeds Tree P. 101

Trees the Cause a very Extraordinary one for Tame [illegible]

Trees. The oldest trees generally shoot out their Leaves later than others, because their Parts being more Compact the sap finds in them Passages lyes free. Tol. Bru. vol 3 P. 87

Trees. The parts of this Tree turnes towards the sun. being raised by the excessive transpiration of their juices and the [illegible] from the sun or [illegible] to sink under the weight of the leaves & flowers & to suffer them to rise [illegible] the parts which offers them the greatest passage [illegible] & towards the sun. hence the Turnsol seems to turn about at the pleasure of the [illegible]

The Rock of the Rocks & the Blows of the Winds are capable of exciting degrees of agitation sufficient to Inflame the sulphurous & saline bituminous substances, & who not the heat of the direct or reflecte do the same. we know that a [illegible] heat Inflames Dulcis fulminans & that only a [illegible] certain Spices & mixture are Inflamed.

Thunder & lightning

Trees. a new way of propagating them. 1. P. 6.

95

Vapours & Cold — the manner how vapours is precipitated by the cold or reduced into drops I conceive to be this; vapours being nothing else than exhalations of water; when they meet with a colder air than what is contained in them, the contained air is reduced into a less space & the water case rendered by that means thicker, so as to be heavier than the air, & so must consequently fall.

Vitriol — see page the 18th at the End of this book.

Venus — hair in [illegible].

Volcanos — See Earthquakes.

Vegetation — promoted by Lime See P. 93th

Vegetable — wax or gum by what means it is acted on P. 93th

Wines — a new way of managing them P. 65.

Vapor how raised from different bodies making smell

When bodies are divided their surfaces are then known to become much greater as for instance any body divided into 2 parts yt surfaces then of these 2 parts will evidently be more by one greater yn yt surface of yt whole before it was divided. yt difference is found to be

so yt as yt force of attraction is in proportion only to yt surfaces of bodies it will be hence evident yt heat as it seperates bodies into their component particles increases yt attraction of the particles at yt time yt it seperates the particles from each other, to which being left at liberty they must consequently adhere to those particles which attract them yt strongest. & this we find evidently to be yt case of gold dissolved in Aqua regia Silver in aqua fortis &c

all objects of smell must be volatile otherwise they cannot be absorbed by the air.

7.31 fol. 41, line 10.

"Mr Descartes once

"showed me

this was me."

Insects

Insects

Insects

of these maggots from to Aurelia. the shape of
the Aurelia has to great affinity with the maggot in
having a space on its back, it that is larger than
the rest of the parts, a sharp back, and tender with
wings of a brown colour.
The maggot Pupa, in this season about 20 days lay
and a feature of an oak chamber which they
called the tops to the warmth of the sun and cold in
winter. and affixed to the bottom where the maggot
transforms little balls which they cross with
the filament until they are drawn in a more sup
ply place, & can from a leaf to each other
the over than a kind of the worm and lay
each long: it then enters into its Aurelia state &
from thence proceeds to its mature state & is affected
with shapes & accoutrements, as if the insect was
a different animal.
In this some kind of pain in their pumpkin. which
has often given occasion to Gardeners to suppose
that some worms have gone into them, for, the
Gardeners complain about worms which
bring disease of the flower leaves to the
bottom. leaves with their crooks & the provident
state which discover to some parts of the plant
to be at them. & crews again & after lay & cases

[illegible]

[illegible] observed. It has been [illegible] the whole work of the insects is but about [illegible] days when a new [illegible] must be [illegible] in hot houses. I have observed some of the small kind of Gnats [illegible] after taking wing, having taken them when [illegible] the Chrysalis & kept them under a Camers Cases.

[illegible] generally lay eggs which [illegible] that [illegible] lay them selves upon [illegible] Flies. But there is one kind of Fly which [illegible] a hump or ball of about 3 inches diameter: the place of their meeting is always upon some [illegible] in that state their young [illegible] into the water [illegible]

in the Fields of the Arbor Fires. the fire is of a
marsh Gaus which is the first product of Putrefaction
happens so that but its first state in the Waters.
Mr. Boyle has now a large Number of them in his
Cabinet.

The Beetle of the Storeroom is something of the bigness
but not so large as the Bug which makes us
imagine that such of the Ants as have Wings or Bees
Wasps have to make after they have made Compost
as the Beetles or Drones are said to do. in Summer
some time part of the West Indies there is a large
fly which they call the Lantern fly that is said
to yield a considerable light.

I look on the Lantern fly to be no more than
a proof of what I mentioned before. for if it could
of effluvia from the Earth or water which are inflam
by Sunne beams or other hot bodies fire who does
not the whole surface appear all in a flame at
once. the Fresh water Gaus ignites without
a Spark. besides was it vapours it could not possibly
be of so long a duration. besides happening to discover
in this Nick of Fortune that I must here make
good Sense the Gentleman from above in the Author
of discourses gave hopes to compare it.

[illegible] a very small Insect much like a Snail, [illegible] are found in July in these places where they are fed & feed. [illegible] when they are [illegible] to generate see more of this matter in Phil. Trans. No. 2

Rotting Paste, Lees of wine & in the infusion of pepper &c we find great varieties of living Creatures. In water where wheat is kept [illegible] with [illegible] being powdered. Vinegar & Pepper water [illegible] of a great variety. [illegible] take a pot of [illegible]

Pepper water to make it

water & put to it 3 or six whole pepper [illegible] then to the open air about 3 weeks. We may further remark that if we put hair, leather or any other part of animal bodies in water, & [illegible] be [illegible] months in June, July, or August, we shall find it full with Insects of different forms.

It is now the [illegible] of Nature [illegible] of the [illegible] plants [illegible] but consider the soil itself [illegible]. The time of the Spring in the Country where it grows. [illegible] we may observe that the greatest [illegible] only serves to ripen our fruits, but for the middle Warmth gradually Encreasing, which makes our plants vegetate.

[illegible] the summer [illegible] Nature [illegible] a 2d shoot which I believe we might bring to [illegible] by a heat regulated by a Thermometer. [illegible]

of

[illegible] for Hornbeams [illegible] to bring first naturally in the Bottom of the Hedges of the first year have been taken off at their first appearance.

Lands on the Sides of Barrow and Hedges

are generally lanes & commonly alone with Hedges so that I would advise the propagation of Fences which are of a very quick growth, useful & agree very well with such land. see how to manage them P. 11.

Elm

The Elm hills agree very well with the Beech. English Chesnut but the greatest Specimen remains in that Soil if it has any Sensible shelter. The Beech in a Sort of this soil is grown much quicker in 3 Years as the present & is passed from the east extent one [illegible] see farther particulars P. 176.

I have [illegible] the Ash, Alder & Aspen for your account see P. 177.

See further observations on fish Ponds see P. 178 to 181.

Lastly the Chesnut tree will grow to an extraordinary size for a view at Saltwood in Lancashire at the seat of the Duke [illegible] is now growing to Dutch Chesnut the Girth of which is 31 feet about 5 feet above ground, his Tree divided itself at Crown into 5 limbs one of which measures 28 feet in length in Girth 5 feet above the Crown of the Tree, the soil is a stiff Clay somewhat Loam & the situation on

the north side of a hill. this tree was presented to a book dedicated to King John & mention made of its blossoms bee at Saltwood. which is probably it must now be above 500 years old. Note.

The Orange tree a new way of Grafting on other trees.

I have found it is possible to cover a grafted orange tree to plant it for 2 months from the heat or frost I have observed also that the seed of a lemon produce a plant much more vigorous than that of an orange in the same time & therefore lemon stocks are better than oranges. but more than a month the kernel has not the tender stem vulnerable that has gr such above the bar leaves. but if they were half as much then the stock was of good bearing which were then tender in shoot & so proportion to the strength & age of the stock & growing the scions [illegible] seed it is therefore a fine it will graft which takes little more [illegible] to the tender; nor this having he put a small quantity of grafting wax as in a few days the stock [illegible] formed & become as much one tree as other [illegible] that will in 2 months time [illegible] of fruit grab & as lately [illegible]. Note.

He recommends the raising all kinds of flowers from seeds.

Trees [illegible] for the sake of their fruit. it is therefore [illegible] to [illegible] for trees [illegible] [illegible] & [illegible]

[illegible] & the most vigorous of the young shoots left at their length for a crop in this case we must have recourse to the [illegible] of the tree reduced a Branch whose growth is great half or more so as to left a yard long; a branch of about one foot or inch in thickness, about 2 feet. so in proportion. & at the same time 2 or 3 buds must be left to supply branches for the following year.

In Peach trees the flowers are apt to drop on account of the Tender branches, which begin to bud out we must plant very short lest pull off with the same hoeing in November or December but we must cover the part to be interred with tempers soft straw & we must be careful a hard blast from the Eastern quarter we have lain that stops it of further use to the growth of trees & that we pain a year for this [illegible]

Wind

an Equipoise of the atmosphere proceeth a cessing and [illegible]
equipoise or more or less taken off a stream of air or wind
is there by intended either stronger or weaker or swifter slower.
there are many many things which cause alterations in the Equipoise
Emptions of vapours, rarefactions & Condensations, the fall of
rain, presence of the Clouds. the most universal & instant
alterations of the Ballance of the atmosphere are heat &
cold, this is manifest in the general trade winds. [illegible]
It is found by experience that the velocity of wind
in a great storm is not more than 80 or 90 miles an
hour; & that a common brisk wind moves 15 miles an
hour; & some are so slow as not to move one mile
an hour.

Wire drawing that of Gold.

A fold Wire drawer takes an Ingot of silver of a
Cylindrical figure two feet Eight [illegible] three
Inches diameter in Circumference upon which he
spreads as many leaves of beaten Gold as may [illegible]
half an ounce. then he takes the silver [illegible]
wonder through a round hole made in a plate of [illegible]
the Entrance of which is wider than the other Entrance
which then fill the eye of the wire [illegible]
Ingot is forced through the [illegible]
hole of it with strong Pincers fastened to a thick
rope which is Rolled in by an Engine turned [illegible]
Man. then makes the silver to run through
several other holes successively [illegible]

[illegible] cases they draw it out to the [illegible] of a
thread, a hair, a coarse thread, & lastly [illegible] that
of a fine hair, rolling it over [illegible]
times then work it through a fresh wire drawing
[illegible] In order to render it more ductile & pale
thread comes a hundred & forty holes before it is
brought to its utmost fineness. this little ingot is after
all this extended into a thread 307200 feet in length
& for all this the gold diffuses itself in such a proportion
as to make it appear one entire thread of gold.

The tools for performing are [illegible] the
[illegible] purposes of melting, cast & drop in the
form of a round bar, a, A, B, C, D. which is [illegible]
a [illegible] with a D, & bar being brought
to perfection, the air is raised so that a [illegible]
part of it gets out at the [illegible] which
[illegible] This operation is made [illegible]
[illegible] water which will [illegible]
[illegible] the water & [illegible]
[illegible] after this set it on hot [illegible]
[illegible] that [illegible] [illegible]
[illegible] of the [illegible]

[illegible]

Wherefore [illegible] to get out in a Cloud at the [illegible] & upon which occasion [illegible] which were [illegible] fly out with great violence [illegible] of water you put into [illegible] & force a [illegible] steam.

[illegible] of the [illegible] the [illegible] Philosophers [illegible] to [illegible] [illegible] the origin of winds to [illegible] [illegible] & [illegible] to this in the Physics the water [illegible] from the sea to these bottles [illegible] [illegible] & the water here [illegible] [illegible] the bowels of the Earth to the [illegible] the Up [illegible] the [illegible] bowels of the Earth [illegible] which the vapour [illegible] the holes of the [illegible] [illegible] upon the sea side.

Water boiling the reason of the Bubbles rising therein.

The air Bubbles naturally ascend in water because the air acts with less force upon the surface of the water & expand themselves & rise up to the surface of the water.

The mill the motion thereof explained

The air [illegible] which [illegible] to [illegible] of the mill endeavouring to [illegible] itself [illegible] the [illegible] spring pushes the [illegible] both [illegible] [illegible] & [illegible] the [illegible] [illegible] are [illegible].

the sails cannot approach nearer to the wind without breaking then can without breaking follow the other Impressed then follow it & the mill goes round.

Dales Phi: vol 1st P. 103.

The general causes of winds are the violent Emption of vapour & exhalations caused by subterraneous vapours & exhalations. the rarefaction of the air by subterraneous fermentations or by the heat of the sun, & the fall of clouds. Dales Phi: vol 3 P. 101

Wind the causes of it.

The air being rarefied, cannot possess a larger space without driving away the adjacent air; the air being driven flows to the place where it meets with least resistance & if this flowing be sensible it makes a wind. thus the air of the Chimney, being rarefied by the heat produced in the air surrounding it a small wind, whose motion is accelerated & makes itself heard in the Interstices of the Door or windows.

P. 104.

The height largeness & situation of mountains [illegible] streightens the Passage of vapours & air exhaled by that means causes an acceleration in its motion. this motion becomes sensible & this is a real wind as on the coasts of Genoa. P. 105

Does a wind encounter high mountains & clouds, it is reflected making an angle of reflection almost equal to the

Hurricanes

[illegible] Fermentation shoot out a great quantity of Spirits & Sulphurous effluvia into the air, which when they fall obliquely from on high; the air charged with the Sulphurous Vapours & Impelled forward with an extraordinary Force spreads itself flows rapidly & ravages what ever it meets with this is called a Hurricane.

Why different winds prevail.

The different qualities of winds. the greatest part of them proceed from divers exhalations which are raised from the earth according to the divers reasons here [illegible] Winds which passe over a great tract of land or the sea, are generally dry. Winds that come from Lands of an are ordinarily rainy. [illegible] Water when it refracts light [illegible] than air. see [illegible]

Mineral waters.

the [illegible] of great [illegible] see [illegible]

Why the Water of the Sea or salt water why it does not be so [illegible] as fresh because that the particles of the two different kinds of Waters are put into motion by attracting [illegible] & meet & clash with great violence. [illegible] with salt is more [illegible] than water alone [illegible]

Why it appears bright & shining light

[illegible] as the particles of fresh water do not resist the [illegible] such great motion. [illegible] The following [illegible] of Sr Isaac Newton may [illegible] all bodies, [illegible] water [illegible] a certain degree

emit light & shine? & is not this emission performed by the vibrating motions of their parts, & are not all bodies when fired with vitreous parts & especially with so numerous ones, emit light as often as those as those parts are sufficiently agitated whether that agitation be made by heat, or by friction, or percussion, or putrefaction or any other cause? as for Instance sea water is a refing stone. seren: Geogr. P. 224.

Waters mineral — ones the cause of their heat of some of them. see mineral waters.

Water — that of the sea is rendered sweet first by precipitating the salt with the Pot of Water, then by distilling the water & thirdly by filtration with a peculiar Earth which flunts all the points of the volatile spirits of Salts, & serveth them for distill. seren: Geogr. P. 214

Medicine — see Mercurial Observations p. 2d.

Substance — the cause of it in Mars? Beach P. 45

[illegible] have generally a discretionary power of living
long for if by any Accident [illegible] broke [illegible]
the [illegible] & [illegible] till they have [illegible] up
the [illegible] they have strength to [illegible].
[illegible] to [illegible] quickly seem to be the usual passage [illegible]
Birds [illegible]. The [illegible] disappear [illegible]
[illegible] the [illegible] of their [illegible]
& then sleep all winter. Their voice is between the
[illegible] of Birds & that of four footed beasts. [illegible]
of the Royal Society [illegible] wonderful [illegible]
be [illegible] that there is such an Animal.
The [illegible] Pigeon [illegible] flies 20 miles in 15
minutes which in 24 hours amount to 1920 miles
which I believe is in the capacity of a [illegible] to
perform. Considering the passage of Birds which if
they go to any parts of this world when they leave
[illegible] must be at least 2000 miles [illegible] either [illegible]
or some part of Africa for they are never observed
in [illegible] after they leave this country.
[illegible] at the [illegible] [illegible] [illegible] has [illegible]
[illegible] provided with [illegible] very [illegible] cases
by them in the [illegible] of the creatures [illegible].
The [illegible] is one of the creatures that [illegible] has been

[illegible]

[illegible] 1608.

[illegible]

[illegible] Ulcerous [illegible] Dr. Pitcairn

[illegible]

[illegible]

If we only suppose that each grain of a Tree contains a second Tree which again includes the same kinds of Seeds, so that we can never discover a grain which contains some Tree or a Tree which contains seeds and then the Preceding the Progression Ceases of smaller [illegible] being [illegible] [illegible] who are not used to push their meditations to any great length. But those who are used to the Books of Physick & Mathematicks know very well that they cannot go far without meeting some kind of Infinity. As if the Author of Nature had been careful that his principle the Infinite should reside in Everything.

I [illegible] could find the [illegible] of [illegible] [illegible] which I think there is no [illegible] [illegible] [illegible] [illegible] [illegible] Animals. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] Deus Creavit Omnia simul we need not [illegible] [illegible] how organized bodies [illegible] from themselves, [illegible] [illegible] formation [illegible] as perfectly [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] themselves [illegible] a [illegible]

Trees are in some respects like animals
like Insects, like the former in the [illegible]
[illegible] & their method of co[illegible]

Trees & females are joyned for 3 days, their flo[illegible]
are like animals, but the Wa[illegible]
is as remarkable as any of the Insects [illegible]
frogs, which are [illegible] days in pairing, [illegible]
[illegible] like willing & unwilling [illegible]
them somewhat analagous to man [illegible]
[illegible] stage of life [illegible]
of their time in another element: [illegible]
description of the Turinum tree which [illegible]
is [illegible] out of the Gates of [illegible] see the
P. 123.

Plants have some like affects to animals [illegible]
[illegible] of each [illegible] from [illegible]
describes the generative parts of [illegible] trees
[illegible] of their growth like the [illegible]
of these parts is in the [illegible] of the [illegible]
are only to be discovered [illegible]
which is about the [illegible] of [illegible]
[illegible] about to [illegible]
seperate without [illegible] their [illegible]
weeks after they [illegible]

lay their Eggs in holes [illegible] in a number near it [illegible] by this [illegible] becomes [illegible] the [illegible] shady places. [illegible] are hatched in about a month [illegible] resemble their [illegible]. Their meeting or Couple is well worth observing in [illegible] Evenings or after a shower of Rain they crawl upon the grass in a circular manner, making several rounds till they come near enough to hit their design. Their flesh is of a glutinous nature; & the Juices which afford the nourishment are viscous which I suppose may be one reason why their motions are so very slow this kind of juices being too thick to a substance to circulate quickly. Their food is green leaves & which they [illegible] by means of a Teeth like bone growing in their upper Jaw with which they scrape the leaves to pieces. See the figures a figure of these teeth & the generally used. The motion of the Juices of the snail is so slow that [illegible] brought to a state of [illegible] than the motion of Juices in other Animals. The beat of the heart of a [illegible] snail is observed to be in about [illegible] because [illegible] of the Pores [illegible] them [illegible] to [illegible] the [illegible] of the [illegible] [illegible] they [illegible] [illegible] out a large quantity of viscous humour [illegible] out of [illegible] which has been treated above).

[illegible] Their motion is performed by repeated undulations [illegible] produce a viscous [illegible] out of their Bodies, [illegible] on what soever they crawl. It is observable they [illegible] have any motion Except when a sense of [illegible] or something & the cold when the ground is [illegible] possibility of supplying its [illegible] Juice. It has been observed that when a snail passes over a [illegible] it looses so much of its viscous Juice that it can hardly recover it again.—Dem.

[illegible] species of which there are [illegible] different kinds in England. About the place of the

Spiders. Head' should [illegible] pincers or lobsters, [illegible] for Pinching & mascerating their Food. Upon the examination of their eyes we discover their eyes [illegible] placed in different spiders. The [illegible] hand [illegible]. It instantly replies in [illegible] unless it be provoked or disturbed. It is remarkable that all the spiders in Europe have Eight [illegible] the west Indies have Ten. As they are of different [illegible] they have different Modes of [illegible] their Prey. Some of the smaller [illegible] from place to place [illegible] other are so very quick & [illegible] in their [illegible]

[illegible] that he [illegible] [illegible] [illegible]

[illegible]

[illegible]

[illegible]

& all the other things [illegible] in the hands of the
men the leaves or flowers of plants. Indeed these
seasons can seem to be only good a wet color
but & the flowers have quite different kinds of
colours in the same hive; & I think such as feed
upon the Seasons or flowers of vegetables change
their colour with the season & the Peoples
[illegible] when they change from the Vegetables
into a Mealy. Bee close themselves in their hives;
there make their retreat under ground & [illegible]
[illegible] out the cold while they are in the state
[illegible] of the pitts & [illegible] but are in large [illegible]
[illegible] & [illegible] between the [illegible] [illegible]
of Wild bees, especially among those which have
[illegible] Carolina in the East Indies, & might [illegible]
[illegible] here [illegible] the proper [illegible] & [illegible]
[illegible] pitts, & perhaps might procure [illegible]
[illegible] if we were to inquire into them. +
[illegible] for the [illegible] of the [illegible] of Bees for the purpose.
[illegible] of which the bees make their Wax is [illegible]
[illegible] flowers, or dust of the spices of flowers, which
they gather in small parcels & bags in the [illegible] of their
[illegible] & [illegible] upon the hairs of their bodies for which reason
[illegible] bees [illegible] [illegible] & [illegible] [illegible]
[illegible] page 26

28

[illegible]

all stones as yet made try'd of being subject to [illegible]
[illegible] to heat [illegible] in [illegible]
[illegible]
[illegible] Acidifying Juice from the heat [illegible]
[illegible] & [illegible] in a [illegible] of years [illegible]
[illegible] larger & if this were [illegible]
[illegible] a kind of [illegible]
Take 3 pounds of [illegible] in 3 parcels [illegible]
[illegible]
[illegible]
[illegible] will be more [illegible]
[illegible]
[illegible] particles [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
the strata of Lead [illegible] Copper [illegible]

Salt [illegible] [illegible] of Earth.

Steam

proofs [illegible] of particles

[illegible] Even the hardest of them as this has been found to have been [illegible] water: [illegible] of the more weight than shells or rocks of stones, and [illegible] to the before [illegible] [illegible] it. We have [illegible] to prove this from many kinds of shells [illegible] found even in bodies as hard as marble almost every many of these which shells [illegible] have been lodged if the marble or other [illegible] they are found in had always been of the same hardness.

We examined the account sent to the Royal Society of a line found out of the side of a rock [illegible] we must certainly imagine that stone could not be otherwise, [illegible] from its fluid state to the time it was taken out of the quarry without we suppose it some time after [illegible] We have an instance of the [illegible] of some time & water & whether [illegible] of Spain to fix with sand & lime which [illegible] Water more binding & speedy [illegible] to the Architects to be considered. [illegible]

[illegible] proceeding from quarries [illegible] not [illegible] [illegible] there is something [illegible] long [illegible] that

[illegible] in [illegible]

[illegible] position of parts to parts, in [illegible]
in the Stock of Substances was in [illegible]
[illegible] Fire in Energy varied
Metalic Bodies [illegible] actations, it must suppose different degrees of [illegible] some
[illegible] Analogous to those in Metalic Bodies. For [illegible]
take from 20 Silver mines an equal quantity of ore [illegible]
that, [illegible] Fire & sorts present the same [illegible]
of Silver which happens, suppose because one is
a riper state than another, because that [illegible]
either great Lead, or some other fixed [illegible]
as for Pebbles, Flints &c Dr Woodward supposes them
to have had their formation in the Earth, [illegible]
the Water which he takes a natural [illegible] &
the Water he gives for our finding so many [illegible]
more is that the fixed Salts, or the [illegible] Earth
parts are distributed in deep [illegible] but there [illegible]
disturbed & more [illegible] left [illegible]
their Terrestrial Covering. The [illegible]
of Stones give the Bodies, I suppose to [illegible]
nearly the same cause as that which gives the
difference of Flavor in Leaves & Flowers of several
kinds, several Minerals & Stones which compose Plants
doing perhaps the same office that the [illegible]
of Earths do for Minerals or Metals; as the different
Juices paying Tribute to several sorts of Earth [illegible]

Effects the Sun of their operation to Colours

stones for a time of filtration, & varies it in its
nice & minute particles which form it are
without such assistance; to these Juices differently
strained through the several kinds of Earth mixing
with some Vegetable particles, which change their
qualities, produce difference of colours in the leaves
& flowers of the Plants they pass through. §. 13.
Hence it seems to be very plain that minerals are
a kind of [illegible] & life [illegible] in a lesser degree than
Plants, as Fish & Fowl, [illegible] not [illegible] of life [illegible]
the passage between these & plants seems to be so small
as allow a place amongst Vegetables. tho' it has a proper
Nutrition Found any other of the vegetative yet it
manifest of Fixing itself to Rocks & Stones like to the
of plants & its branches have some resemblance
[illegible] it of different species as much as any
any plant. The brittleness of it will not be any reason
for not placing it amongst vegetables for succulent Plants
is true of the Fly there are Small brittle because
[illegible] & [illegible] Vessels.

The Sponge is the next which leads to Vegetation
[illegible] have a plant yet is remarkably imperfect it is

a wonderer as well as the [illegible] only. the Sponge is generally globular & composed of parts [illegible] Fish than any other part of a Plant [illegible] either leaves, flower or fruit [illegible] the most 100 [illegible] seems to be the [illegible] next to that the [illegible]. P. 18.

Gualtherus The Method of raising them from [illegible] Pigeon [illegible] the Rush seems to follow the [illegible] a sort of an Amphibious plant. then the [illegible] Torch Thistle. these the Indian [illegible] which [illegible] approaches to the resemblance of leaves.

here follows an Essay on the [illegible] between Plants & Animals drawn from the difference of their leaves. see P. 25th n. 83.

The next to the Thistles are the Herb kind as [illegible] the Tradescantia, the Primrose, Auricula, Sun [illegible] Mastrastrum, Berry & Violet are the next to these [illegible] kind. The 3d sort is of those plants that are [illegible] which as they have not strength [illegible] to support themselves nature has given them a sort of Instinct to advance towards [illegible] to support it. the 4th is the [illegible] Sea Fish which as they want the [illegible] of Thistles [illegible] Sponge [illegible]

A Shrub is that kind of Plants which in every circumstance Except its Height & duration Imitates a Tree of this race is the Box, Yew, myrtle, & Juniper & are brought by Pruning [illegible] to perfection see p.t 36.

vide Laxr.

The 2d race of Shrubs are such as have an Inclination to Climb as the Honeysuckles Jessamine &c

ye 3d is such as have Claspers as the Vine &c

ye 4th is such as have Tendrils for Climbing which strike into the bark of Trees which [illegible] inclined to follow they draw some support from as the Ivy [illegible] scarce Ever make so vigorous [illegible] as those that are Clear of them. of this kind is the Ivy & Virginia Creeper &c

A Tree is a Plant, the most lofty in Growth & having its parts the most robust amongst which are [illegible] the distinctions 1st Nuciferous 2dly Pomiferous 3dly Coniferous 4thly [illegible] 5thly Vasculiferous. [illegible] remark that [illegible] [illegible] is dependant [illegible] [illegible] the first [illegible] are such as cannot support ~~[illegible]~~ without [illegible] the Stamina with their Apices found in the Blossoms. these are [illegible] not liked so many [illegible] [illegible] [illegible] in the [illegible] of the [illegible] [illegible] impregnate the Style of the Blossom with the Farina

[illegible]

[illegible]

Inchelse

[illegible]

[illegible] proceeds to blossom & bear fruit
will be a great Rad. tis remarkable that [illegible]
the sort of this in Island the that of the Cat has [illegible]
Rich acuiree get Fruit fine but that of the [illegible]
or any other have the same part of Fruit [illegible]
not observed that Fig: Trees [illegible]

or bark because I suppose they think a Plant still preserv
its original Virtue, let it grow in any soil, this has such
Credit as Apples for the prevention of Scurvy. Apple
may be grafted on a Pear tree or Pear tree & yet the
properties of the Golden Pippin remain the same, yet
an Oak planted upon a dry hill will not shoot as quick
as one in a Low bottom & flowers continually change
their colour with the Seed. This plant is a specific in
Sick Cases. 9. 39th

We are next to consider Mosses growing upon the barks
of Trees as the Cups moss, that which barches like bread & that the a
Lines of wool, these are all white, bear seeds but are more perfect
is the green mosses. The time for their growing is in October.
We now come to those Vegetables that depend upon Trees
but such as may nevertheless be made familiar with
the Juice of the Earth, but for the Shade part of
a Tree they become perfect Plants. for Instance plant
the Leaves of Orange trees & they Evergreens & they will take
root & produce perfect plants if well watered & kept in the
Shade the Leaves of aloes will do the same. Twigs &
branches are really Vegetable plants growing upon dream other
the twigs take root in the branches, they in the Stem.
[illegible] Shade & preven cutting as preserve there to 9.42.
logs its great use in promoting the Vegetation of Seeds see 9.43.

[illegible] greater, the proportion [illegible] in growth & a full grown Oak [illegible] one [illegible] the same stamp of an all powerful Creator. see Pg 45.

The proportion [illegible] the growth of its leaves, &c. [illegible] 40.

The leaves of the same plant when full grown [illegible] 2 inches long these from their state in the bud, till they are fully expanded require about 7 days [illegible] is about an inch & half each day. It is that pleasing [illegible] prompts those who [illegible] with the microscope & observe the circulation of the sap in the leaf & have the satisfaction of seeing the plant grow & its parts [illegible] much quicker than the hand of a clock [illegible] pauses or rests in its motion.

Some unskilful people have thought that some Plants have share of sensation as the humble & [illegible] Plant, the Tile or Spurting Cucumber [illegible] of the female Blossoms, but this is to [illegible] when we consider that the fruit of the [illegible] never flies from its stem, till its cells are over replete with Juices, which is the same cause as the free boots of the Blossoms, have parts [illegible] fall when they are quite ripe, that the [illegible] even at the least touch, but the falling [illegible] the leaves of the Humble Plant & the leaves of [illegible] seems either to proceed [illegible]

Sensitive Plants considered.

the tenderness of the vessels which convey their sap into them & retain them to the Twigs they grow upon or else that they cannot bear and be incommodated by the air. for in a very warm day, when the air is serene, these Plants, if they stand abroad are not affected by it, or will scarcely give way, tho they are touched with some violence; but if the weather be cool they are seemingly declining & resist the touch without any Alteration. On the Contrary when kept continually under glasses, & the sun shines upon them, they do not only decline if touched with the hand, but are subject to the same vibration by any Extraordinary pressure or motion of the air by a fan or handkerchief at some distance from them: & I observe they never appear in a right state of health, or have their leaves expanded, from the time of the sun's setting till its rising again. 347th

Some in the next place to that of those Trees which, like plants want local motion, but have such a share of animal life as to attain it — the Power of sensation of heat are the Oyster, the muscle, the cockle, the mussel &c which are not as far bar, altho removed from their first station. & so we find the Journeys of others not before observed therein by persons from the Coasts of the Sea or from

the spawn of them which [illegible] 116
carried from place to place by the currents or tides.
He publishes by some curious observers that such shell
fish are hermaphrodites, which is the same with snails
which are each of them confined to their several
stations without the power of seeking at distances
one of a contrary sex. The [illegible]
a deep at greater ever to be uncovered. The [illegible]
[illegible] at second appeared to be [illegible]
dry at the fall of the tides. The Cockle is [illegible]
[illegible] in the sand upon flats, shores but are
found at low tides & are commonly [illegible]
worms. Oysters & muscles will [illegible] [illegible]
when they can get at it as instances the oyster
at Colchester & the Cockle on Sandwich. In the
East Indies there are oysters in abundance of
[illegible] which are exhibited [illegible]
the curiosities of Mr Pocock at Greenwich. These seem
to have only the power of sitting & rising. [illegible]
[illegible] a leave of the [illegible]
which have no eyes that we can find of. Some
shells have inside a vegetative growth & have
[illegible] of vegetation. [illegible]
[illegible] found with the [illegible]

of the Star. The Star-fish or Serpentula are
best taken notice of the last of which have a
very considerable motion in the water being
perpendicular to the surface. It flapping
with a quick motion & it seems probable the
Sea-star has the same which seems to be a larger
kind of Star. here follows Mr Leeuwenhoek's observations
on Muscles Fig. 53.

The next fish to these are the Lobsters Crab &c
the which have local motion. the Lobster, Crab
&c may suppose partly vegetable partly animal
as Shrubs broke off will grow again, for vegetables
have a power of renewing their branches which
are broken or cut off, but no animal shows
the power of renewing a lost limb. here follows
a description of the Lobster & Crab Fig. 54.

The star-fish

In another part of vegetable shellfish we will
consider the Oyster & Cockle &c. Lobsters &
Crabs & all of this kind are in the power
their Poles & do not feel any motion for the
of Cement, no more than for the service of
generation.

Now come to treat of such shellfish as move by means

40. of an [illegible] region of their flesh, part
of the shell, some of these can swim & creep at their
pleasure others only creep upon the sands or rocks.
as periwinkles or snails. [illegible] have the same kinds
of bodies [illegible] those the Nautilus, [illegible] Strombus
[illegible]tex. Buccinus Trochus. Conchae.
I come now to treat of such fish as are [illegible] the
Inhabitants of the waters that can breath in no other
Element such as have their motion by swimming
and with fins as Oars. [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] the same [illegible] [illegible]
it is [illegible] they all feed upon [illegible] [illegible]
or other fish & it is for this reason they go from
place to place at certain seasons in search of
their food. I am informed that some shoals of
[illegible] [illegible] from the [illegible] Southern parts as from
the Coast of Guinea, where the [illegible] is [illegible] of [illegible]
this fish is dispersed & shoals are [illegible] [illegible]
[illegible] Exceed them in number. [illegible] [illegible]
& many other kinds of fish have their seasons
of coming upon our Coasts. [illegible] observes may [illegible]
of passage come in shoals as [illegible] as the
number of the seas will permit, on which it
is wonder that their [illegible] in such [illegible]
[illegible] [illegible] [illegible] [illegible] must have a certain [illegible]

[illegible] time [illegible] more the [illegible] of the
[illegible] appear also on the same [illegible] if [illegible]
[illegible] fish and fish of prey then fish then preys
will get [illegible] before them if they cannot meet
with [illegible] food.

[illegible] Life [illegible] [illegible] at [illegible] have used
for the preservation of their young in [illegible] and
other [illegible] in observing the [illegible] with [illegible]
[illegible] have adapted her [illegible] to [illegible]
[illegible] preservation & [illegible] [illegible]
[illegible] has [illegible] of so great a [illegible] as to [illegible] the
[illegible] of [illegible] [illegible] time to [illegible] [illegible]
[illegible] [illegible] with [illegible] [illegible] [illegible]
[illegible] to others smells. here follows an account
of [illegible] backs nest p. 62.

[illegible] seem to [illegible] the power of separation as well
other animals. [illegible] sight [illegible] [illegible]
[illegible] [illegible] of fish [illegible]
[illegible] [illegible] [illegible] [illegible] of [illegible]
[illegible] to have no [illegible] from [illegible]
[illegible] but their [illegible] or smelling is more [illegible]
[illegible] by one thing than another as for [illegible]
[illegible] [illegible] [illegible] to feel at the [illegible] of a whistle

[illegible]

[illegible] fish [illegible]

[illegible] of the Cod are quarrow [illegible]
[illegible] which I suppose are no [illegible]
to maceration than teeth [illegible]
[illegible] proportion to the bones [illegible]
[illegible] of their tails [illegible]
[illegible] of their tails their [illegible]
[illegible] to their heads [illegible]
[illegible] in Jaws are [illegible]
[illegible] matter that [illegible]
[illegible] of the [illegible]

[illegible] in the Eel being cut to pieces [illegible]
[illegible] for several hours as if [illegible]
[illegible] the past reasoning a supply [illegible]
[illegible] to submit. which is something [illegible]
[illegible] observed in ~~plants~~ every distinct part of [illegible]
[illegible] next to this is the [illegible]

no snakes alive in what strange. the Cobra heard hill
beat regularly an hour after separation.

as only salt water is necessary for the keeping of
sea fish but that also should be kept in motion for
which reason the fish women in Holland have their
tubs in which the fish are kept perpetual in motion
with a paddle which if they omit for but a few
minutes the fish die.

Captain Cook the circulation of juices in a great
creature is not always promoted by the same use
or performed in the same manner for in creatures
in the sea frogs than their juices circulate
& have not blood as land animals the heart the
immediate seat of circulation where in the Cobra
Eels and the several kinds of rat. p. 5. 8.

[illegible] continued [illegible]
[illegible] dissection of life after cut to pieces. [illegible]
[illegible] after [illegible] in spitted of [illegible]
[illegible]. [illegible] Hercules [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] very frequently.

have accounts of Crocodiles &c

[illegible]

there is a kind of mem of a cuppere [illegible]

[illegible]

& generally perch upon Trees.

[illegible] have see kind of nest & are lost

[illegible]

animals or vegetables into [illegible] & if [illegible]

[illegible]

[illegible] same effect.

The feathers of birds are in [illegible]

[illegible] different [illegible] of the [illegible]

[illegible]

[illegible]

[illegible] with the first stages of life have not [illegible]

[illegible] the [illegible]

[illegible] kind of [illegible] life

[illegible]

[illegible] of Birds [illegible]

[illegible] speaking [illegible] an account of it see p. 81.

[illegible]

[illegible] Conjectures that the cause of Birds taping from [illegible]

Air

as soon as ever the fire breaks loose from the bubbles & kindles the other combustible matter it meets with, the air being thereby expanded & put into a violent motion rushes impetuous against the neighbouring clouds, which being violently impelled by the force of the air the bubbles of which they are composed, break & discharge their fire likewise in all directions, which necessarily causes a succession of flashes, & makes the rain pour down with greater vehemence than before, & this is generally the case immediately after a Thunder clap.

Winds

Though winds seem often pieces from under the earth, yet they are formed by a stream of air rarified by the subterraneous fire, & violently impelled upwards, yet there are some winds that blow out of the clouds & make terrible havock in a very little compass, called Tornadoes, upon some places & whirling round & round without doing any damage on places that are contiguous. & there are occasions on the rupture of the air from the bubbles of water in the atmosphere which rise in the greatest elastick force where it meets with the least resistance from the clouds. Some of those mischievous effects which are produced by lightning in times of thunder & storms, the first mind that arises before it the form of the cloud generally bears an horizontal

Whirlwinds their cause

line; it very often happens that at the same time there blows from another quarter of the atmosphere a strong wind which causes the clouds to dash & rush against another; after the lightning & thunder clap we often feel the sudden & terrible shock of this wind, which is that air disengaged from the middle of the cloud in the manner we just now related. which as it is all ways very hot & suffocating & brings with it a very noisom stench of sulphur; which plainly denotes the nature of those matters that are mixt together with the vapours into the upper region of air. when this rapid blast of wind descends towards any inferior strata of clouds whose particles have been condensed by the cold into hailstones it darts them down on the earth with so terrible force the so many bullets, which often does more damage than the Thunderbolt itself. when other winds besides these issuing from the region bearing the sky fly to the fight with whizzing speed, & rush their adverse forces, a hurricane straight rises terrible effects of which everyone is sufficiently acquainted with. all these the greatest ingredients which seem to put nature into a general confusion are of infinite service to mankind not only in cleansing them of their corp. but in clearing p

The air of any impurities or unwholesome vapours that may be generated might occasion, by destroying some swarms of insects, which though useful in some respects, yet would prove prejudicial to man if suffered to multiply in too great abundance.

Earthquakes how caused.

The vapours being condensed & falling down in rain on the surface of the earth, mix with the salts which the air has there deposited, the different salts with which the bodies of animals abound, oil, dung &c. &c. & many different compositions which soon sink the water into the earth through tortuous & different drains & fissures, sometimes staining beds over strata of salt sometimes over beds of sulphur at one time passing through mines of Iron, at another through layers of Bitumen, depositing a very small part of these bodies as they pass along these subterraneous Rivers but up on the sides of their channels meanwhile smaller quantities of these saline materials which dry & incrustate in layers one upon another as the water ebbs & falls away. the compositions thus formed the least particle of fire, kindled by the sun, or kindled by any other means, whether by fermentation which is very common betwixt sulphurous &

Mineral Bodies, or by some mass of Burning [illegible]
in the subterraneous caverns inflames these particles
of sile [illegible] & these communi-
cate it from one grain of sulphur to another. the
Combustion being thus begun, the [illegible] gathered
together, the air [illegible] undergoing in its behalf
a motion [illegible] the [illegible] of Fire,
which is the most powerful agent [illegible]
Ingredients. thus the surfaces of the [illegible]
Greatness of the [illegible] with which [illegible]
rage is not [illegible] and amazing [illegible]
that what [illegible] have met with [illegible] resistance to
obstruct their passage, has made the [illegible] to
shake & tremble from their Centre to the [illegible]
throw whole Towns & would lay in ruines whole [illegible]
had not Providence which weight [illegible]
& dangerous Effects of these tremendous forces [illegible]
to their power by opening at proper distances [illegible]
Volcanos, or vent holes, that [illegible] the
air may loose their strength [illegible] Volcanos are a blessing to the Countries they are in.

Many [illegible] of [illegible] in our [illegible]
Countrys [illegible] Mineral Waters. [illegible]
[illegible]

settled mist, we generally perceive at the time
of the sun's approach to our Horizon a little
east, it is seen a pretty quick eastern wind,
which probably proceeds from the eastern air, was
Dilated by the return of the sun, & driving before
it that which is more Dense & farther from the
sun, which necessarily causes an Eastern wind,
which ceases as the sun advances to our meridian,
& heats our air. by parity of reason the same
wind must always precede the sun in the Torid
Zone to the proper part than in our climates
where the influence of the sun is more Diverse.

The Trade Winds.

But in as much as the sun passes by Leaves from
one Tropick to the other when it advances towards
the north, the northern air, & acts upon it the
sun endeavours to expand it self, but being opposed
by the Body of Condensed air which is still more
northern, it must consequently be reflected back
to the Equator, from which quarter it finds the
least resistance. hence proceed the trade or monsoon
winds, which blow with so much Great quantities of
Air, that prove so serviceable & refreshing to the

Substance of the Said Tale on file for the Lords
the reference on the reports of the ciro to the Book Natures Display Vol 6 p. 222
of which Display is Commenced at the 201 Page which
well worth reading.

But the 2d Power or the Animal spirits Page 91 of 1st

is known to other that animal spirit are diffused throughout the universe in all Bodies whatever to give them motion & vegetation & mineral, Vegetation & Generation of Plants & Growth of Animals in fine the [illegible] Cause of all Motion & Spirit before said & spiritual now in several states so that they may be in more or less states

1 Fixation
2 Fusion
3 Volatilization

1st Fixation is when they are so compacted & locked in within the proper particles of matter that they all hard to be seperated as in Gold & other Metals.

2d Fusion is when the spirits in kind of deep heat are so wrought towards liberty that they are in the middle state towards volatility as in half digested minerals fermenting, ripening & half ripened fruits.

3d The spirits are in their state of volatility when after a time with the proper particles they have overcome them & are ready to fly away as wine in the height of fermentation & in every part of our animal blood always. We observe that some Bodies that relax & open the proper composition of bodies, do presently create a fermentation; for tho the stomach & bowels set the spirits at liberty which presently fall to work & fly the other parts seperating the heterogeneous, relaxing some, strengthening others, digesting some & expelling some as grand work of nature. Bodies & the parts of it are fitted to purpose. In all which there is a sensible heat produced. Thus this spirit being inbreed in the earth & putting it with convenient matter with presence & heat creates an animal heat, wherever it operates, as in Stoves & Tan Pits, which being broken, & opened & moistened will gather an extra heat & presence much more of those minerals than the [illegible]

As is proved by Common Experience.

the spirits that are lodged in nerves & fibres are in a [illegible] state when [illegible] set at liberty transmitted to the Brain & there give motion to the rest of the whole machine. so that what we call the Animal spirit are the purest, subtlest & most volatile particles of the blood, which by the continual vibration of the heart are carried with the blood into the Brain & there the thick & gross substance are [illegible] separated from the [illegible] & thence to the several nerves & fibres transmitted to all the parts of the body. the thick & gross because of their greater quantity have to be [illegible] in the blood vessels [illegible] but the finer spirits [illegible] are easily pass by a quick vibration through the Brain, spinal marrow & nerves [illegible] which are [illegible] to the [illegible] of the Body. that these spirits are the immediate instrument of the soul in all her operations [illegible] we have the greatest reason to believe. First for Instance it is plain from what is discovered in dissections, for the Brain itself is but a moist & fluid substance [illegible] therefore it is a sign that the immediate & general instrument of receiving the Images of things, are the spirits in the Brain. Secondly that they are the chief Engines of sight is plain not only because the eyes are full of these lucid spirits; but also because dimness of sight comes from a deficiency of them, tho the parts of the eye be otherwise entire & whole as in sick & old persons.

[illegible] more [illegible] & [illegible] motions of the spirits is required for sensation than for motion, to instance the muscle itself that brings the [illegible] is a [illegible] indication of a greater flow of spirits directed thither. [illegible] Nerves [illegible] which we believe [illegible] sensation [illegible] only [illegible] by a vibration, [illegible] the seat of remembrance.

[illegible] these spirits being [illegible] the [illegible] [illegible]

the sense thereof you all consider? for if it were an immediate
faculty of the soul to contribute unto the well working? do not under-
stand, we trule see be wrong.

For the corporeal spirits have a mixture of the spirit
into the brain, or at least a mixture of them in the animal
all nature being required by virtue reservation of them in the
brain for the animal works which being not with
out blood arise. Well you have heard all before:—

a liquor without discovering silver whilst

without discovering

silver probably on

a difference

the point of the spirit of salt being probably finer than

those of the spirit of nitre

in infusion into

the parts.

tracts further than those of the spirit penetrate

pores of silver with difficulty

with so salt in the aqua Regia therefore

demolish it because the spirit of salt

[illegible] that distinguishes and a [illegible] [illegible]
[illegible] quantity of [illegible] [illegible] [illegible]
[illegible] Stones both whenever does this [illegible] [illegible] from the
[illegible] of the Stones. 41st P.

[illegible] discover to us as well as power of [illegible]
[illegible] in stones: for wine which is more
[illegible] into the substance of several [illegible]
[illegible] [illegible]

[illegible] of water in wine power this [illegible]
a vessel made of [illegible] the water [illegible]
[illegible] the pure wine remain. P. 42

Run two pins into the two Extremities of a stick about
3 feet long [illegible] as large as your [illegible]. Place two
chairs half full of water upon the tables of equal
height about 3 feet distant. Let the stick in a level
situation so that the two pins may rest upon the two
of the chairs. Strike the middle of the stick [illegible]
& you may see it broken cleanly without touching the
chairs. If the two Extremities of the stick rested upon two
threads hung up perpendicularly, we might see the same effect.
When the violent, but successive Impression reaches the two
Extremities of the stick they are elevated in proportion as the
[illegible] yield & descends in the fracture & [illegible] [illegible]
the glasses or threads the [illegible] [illegible]

(81)
under

is a bitumen which the waves of the sea throw upon the Coasts, where it is hardened by frost & heat. §178

a violent agitation, a sort of heat caused by rubbing in the subtile or fiery matter of Amber & other Electrical Bodies makes a kind of vortex issue out of them as out of the loadstone whose celerity at first compresses & expells the air but in a short time the compressed & expelled air is dilated & becomes rarefied drives the chaff & other light bodies towards the amber &c. §232.

Fire brand

. The extinguished fire brand throws out more smoke because the particles, which a rapid motion there dissipated are united having lost a great deal of their force, & compose altogether a heap of gross parts, which pass off in smoak. §376.

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after rubbing the Hands with the Juice of a bruised onion hot may be washed in melted lead without any injury, or any burning coals may be taken up without damage. The Juice which covers the skin & fills the pores on the surface of the hands, hinders the action of the burning coals & melted lead from joining and hold or spreading itself with too much violence

Onion Juice

Fire

on the hand. Person who make a Trade of handling fire & holding it in the mouth make use sometimes of an Equal mixture of spirit of sulphur salt armoniack Essence of Rosemary & the Juice of Onions. If the Excess of the action of fire is great it makes a sensible seperation of the parts of the body & his spirits are what they call burning.

heat

In dissipative the fixed particles which make up fluid hardens them much after the same manner as it hardens Dirt:

the reason a kettle seems less hot at the bottom after boiled before the liquor boils is because then the particles of fire have found a passage & are less reflected back again whereas before it boils the particles are reflected towards the bottom & by their reflection augment the agitation which causes the heat.

Why the bottom of a kettle is hotter than the water does not boile.

Vol: 4th 2d.

The reason why the air of the middle Region is generally colder than that which Environs us seems to be the reason of that the air we breath is put into a Int. and rarefied by the rays of the sun reflected from a Lower region of the earth which that in the Middle Region is only a direct impression from the rays of the sun.

Q. aion.

its being warmer here than in the middle

The Rays differently reflected by the Inequalities of the earth cannot raise their Action so high. for this reason we find the Tops of high mountains covered with snow in summer, even between the Tropicks. Pag.

Acids & Alkalies are two species of salts very different

Pois & Acids are like darts sharp, long, pointed & edged.

the Alkalies are corpuscles more crass earthy, Alkalisporous & spongey like somany sheaths & seabbards proper to receive the Acids. Pag.

when the salt of tartar per Deliquium being poured into the solution of any metal precipitates the metal & makes it fall down to the bottom of the vessel in the form of mud does not this argue that the acid particles are attracted more strongly by the salt of tartar than by the metal, & by the stronger attraction go from the metal to the salt of tartar. from the Doctrine of Attraction & Repulsion all the Phenomena in Chymistry seem capable of being accounted for.

Precipitation accounted for

solutions when aqua fortis & filings or Iron with a great heat are caused. Ebullition is not it effected by a violent motion of the

(6) parts & does not that hinder argues that the tenuer parts of the Liquor rush towards the pores of the metal with violence & run forcibly into its pores.

P. 49.

If one mixes the volatile spirit of sal armoniack with spirit of wine or spirit of nitre with oyl of tartar per deliquium you will see a coagulation. the reason is because the acids being absorbed into the alkali make with them molecules which interrupt the motion of the spirit of nitre being poured heron dissipates the coagulum by the action of its point. - P. 52.

Coagulation
Acid nature

To make

To make

To make

To make

The

Marts.

Marts.

To make Philosophical grapes take one ounce of sal armoniack dissolve it in four ounces of Burgundy or Champaign & expose this solution to the sun in a Dutch bottle, there will be formed some small clusters & bulbous heads full of grains somewhat like mulberries & fixed to certain stalks. the flowers of sal armoniack will produce full as fine ones in common water.

Philosophical stones how made.

[illegible] the spirits of the air which virtua[illegible] [illegible] the mixture [illegible] the parts of the [illegible] the pores of the salt of tartar & [illegible] the internal [illegible] [illegible] at the same time, [illegible] the air [illegible] which makes the flowering [illegible]. p. 65.

[illegible] water [illegible] a bottle of [illegible] height [illegible] with it [illegible] & set it in the sun after such a manner that the sun may warm it without darting its rays upon the top, the salt will remain in the [illegible] & you will find in the receiver [illegible] water [illegible] an experiment of M. Lauthier. [illegible] may also [illegible] the secret of making [illegible] strong [illegible] water [illegible] [illegible]

Sea water drinkable.

[illegible] to furnish a ship with a quantity of water sufficient for 200 men while at sea. — that the salt water thus [illegible] when wrung have nothing in them disagreable to the taste or smell. some the reason seems to be that as the salt is seperate from the water when it [illegible] composes certain arch molecule which prevent the water penetrating for or [illegible]. [illegible] that they [illegible] not much into the organs of sense, tear their [illegible] stop the course of the spirits swell the fibres [illegible] them. it also proceeds from itings &c. §. 82.

Mineral waters see springs.

Subterraneous fires are transient for every [illegible] body being once kindle is dissipated, but the heat of mineral waters has subsisted for several ages, [illegible] then can their heat proceed from some subterraneous fumes & vapours such as are to be seen in the [illegible] in Hungary or from some mixtures of minerals [illegible] sulphur & the like. §138.

Sleep. sleep does cause the fat persons more subject to the [illegible] & even causes excite it. see sleep.

To know whether a child was still born or not
you must put a piece of the child's lungs in
water. if it sink to the bottom the vesicles
contain no air, & the child has therefore never
drawn breath for here always remains some
air in the vesicles after respiration. if the
piece of the lungs float the vesicles contain air
& therefore the child has drawn breath & if
it lost its life after it was born. Ryne.

to know whether a child was still born or not.

The season some animals sleep the winter is that
transpiring little & so much less as the cold shuts up
the pores of the skin, the fat that passes from the
bowels by the veins, distills into the blood, is sufficient for nourishing
the blood & tempering it a long time & as it has little heat,
the spirits are not agitated sufficiently to awake
the animals. but when the heat of the season begins
to be felt & the fat being consumed, the blood becomes
hotter & more agitated, the spirits make precaution impressions
& the animals awake.

Lamp fish see Lamp fish.

[illegible]

[illegible] that passes into the [illegible]

[illegible]

[illegible] Humors. The Sarcina is the most fruitful of others because in the first the Corpuscles which are separated from the [illegible] are much attenuate. In after the last [illegible] attenuated, more united by the Pile, [illegible] they are in a better [illegible] [illegible] Impressions.

The difference of Scents arise from the difference of the shape, the figure & motions of the Corpuscles that are the most the finest & most agitated a pleasant smell, because those that are too Gross, the mass too much; those that are too fine, too fast; those that are too much agitated do hurt the organs. Corpuscles of a moderate smallness & motion [illegible] Effects. Nature is neither too [illegible] because the power of smelling ceases the [illegible] of smelling. hence [illegible] Fishes of very sweet [illegible]

(11) scent the Forest because the Salt [illegible] small Lapwings
sometimes on Dung which please at a certain distance
becomes disappeared & [illegible] cast. the reason is because
Fine pleasant smells [illegible] the Organ of smelling & the
[illegible] of its motion. Sometimes from two [illegible] [illegible]
[illegible] arises a third when mixed one can scarcely bear
because the mixture renders the particles too strong
[illegible] of [illegible] the Organ. [illegible] the Tobacco from
[illegible] pleasant one.

Some smells wound
[illegible] as [illegible] death as that of the Rennoval to the
[illegible] make the smell of which [illegible] killed in half an
[illegible] Probably the smell stops the passages of respiration in
these Animals, or ferments with the Blood so as to [illegible]
[illegible] either by stopping the passages of the Blood, or by
shutting up those of the spirits. Q.E.

[illegible] have vessels of the earth of Etna which
are very Extraordinary they make them so small & the
Earth is so light that sometimes one makes them flutter
[illegible] of the winds. the water in these vessels
takes the smell & taste of the earth & become delicious.
[illegible] are extraordinary after they have drunk the
Delicious water, they speedily eat up the Bottle itself into
[illegible] [illegible] with [illegible] are [illegible]

[illegible] 2.86.

Musical Instruments like Voices like better wind Instruments.

[illegible] into the Ear seems to be because the [illegible] will be next the finger & the Tympanum & is agitated by the corpuscles which [illegible] strikes the tympanum. 2.66 Pag.

Water is lighter than air the rays find in water less resistance than in air & are more direct more free & [illegible] & consequently more [illegible] corpuscles which might [illegible] the direction of the rays & [illegible] force.

Water is rarer than air [illegible] more weight & the air is certain [illegible] the passage of light in it are more free than water.

Water is [illegible] shortest path [illegible] transparent if metals be dissolved in menstruum they become [illegible]

Gravity since it proceeds.

Gravity does not [illegible] in bodies because the rays through which the light might fall, is stopped by particles of matter. [illegible] required for gravity that the light [illegible] & deflecting from a right line for which there [illegible] required the operation of the instruments [illegible] a body perfectly transparent such as [illegible] which bodies [illegible] & separates [illegible]

that these interstices are either void or filled with a medium whose density is different from that of bodies, of light passes such a way it will every moment fall upon a surface divided mediums differing in density; therefore it will undergo innumerable reflections & refractions in that way so as not to be able to get through it. hence we see that opacity depends upon the pores for if you fill the pores with a medium of the same density as the particles of the pores themselves, light will undergo no reflection or refraction in the way but passes directly through, & the body will be transparent. tho' we cannot make experiments where to fill the pores of a body with a medium exactly of the same density as the particles, yet the following experiments will clearly prove Sr Isaac Newton's doctrine concerning opacity.

Exp: 1 Paper becomes more transparent when wet with water; for it fills the pores & differs in density from the particles than air does. Oil has the same effect.

Exp: 2 take a pieces of glass 2 inches thick, & take several pieces of the same sort of glass lie one upon another but so as not to be quite two inches thick & you will find that the pile will be less transparent than the solid piece

114 because of the air between the Plates which does not get into the solid Piece where all the parts are pressed into water & they will be more transparent than when the interstices are filled with air.

Exp. Let any transparent liquid that may be bought into froth or shake till it be full of bubbles it will immediately become opake by reason of the innumerable that are filled with air. as Spontaneous water & Ale water. we clearly see in all these cases that opacity is produced because there is a medium of different density between the transparent parts which may be observed in the Ale which we gave an account of the air interposed between the particles of the water.

Some opake bodies reflect a little light & the rest of the light by innumerable divisions & intermixures in the reflections & refractions are so much extinguished as they look black. Sometimes a green meadow, appears all white at a distance notes on p. 290 & when you look upon a piece of revine meat with water on it cannot distinguish in appearance between the parts of water nor the white parts of the fat. the reason is because the red rays represents to you white in that direction. the reason is because

Impressions that come from the red rose is stronger than those which come from the yellow & the strongest being spread all about upon the Retina, render the others imperceptible. Colours & objects draw all our attention, when they are mixed with others.

p. 302.

The reason a person going from a well lighted place into a dark one can see nothing at first is because the Pupil that was contracted in the well lighted place in order to keep out the rays that might hurt the organ of sight, remains still contracted for some time in the dark & does not admit a sufficient quantity of the feeble rays for perceiving objects. p. 322.

Mirror Convex the reason it presents objects smaller. see mirror. Concave the reason of its magnifying. see mirror.

Why are bodies appear differently coloured, because the figure of their pores & the texture & constitution of their parts reflect more rays of one kind & reflect fewer rays of the kind while they transmit the greatest part of the others or absorb them. Red bodies for example reflect more red rays. accordingly being plunged into homogeneous rays of this colour, they seem to be red. Red reflects yellow rays while it absorbs others

(16) to pass through, for if one place a very thin plate of glass between the light & the eye the least paper touch it it appears blish or greish. Thin glasses transmitt certain colours but reflect others. Q. 382. Powder of the root of dwarf dwarf [illegible] a very pretty blue Ink, which he drops of the Juice of Lemon turns [illegible]

Gallas. Vitriol. Dissolve in water some white Vitriol, Ink some Galls in water half a day filtrate them seperately & they will each be transparent. Mix them & they make a black. the Particles of the vitriol & Galls are hooked together in the mixture form solids big & stiff enough to shut up the pores of light & prevent its rebeling enough to alter without making it recoil so strong as to affect the Organ of sight. Pour a little aqua fortis in this mixture & it becomes trasparent because the acid by disjointing the molecula restores the pores of the light. Q. 385.

Sublimate corrosive. The solution of corrosive sublimate & of fixed per Oleiginum mixed will appear red but when seperated transparent. the liquors being thus by mixing reflect the red rays which are of the liquors when seperated let pass. upon this [illegible]

If I put a little spirit of sal armonia the mixture will be as white as milk. that is because the mixture reflects at once a great quantity of rays of all kinds. a little aqua fortis make this disappear, the corp. points of the aquafortis dissolving the metals restores the transparency. P. 387.

In the northern countries several animals are white in the winter, & another colour in the summer, the reason of which is, the excessive cold shut up the pores of the skin & also the small pipes of the hair, which pipes then resist in the hair. the hair

Bears in northern climes white in winter & black in summer.

is then [illegible] on mens heads for want of use. [illegible] it has its superficies [illegible] consequently it reflects more spectral [illegible] at all sides & with more force, hence proceed the whiteness of the animals in winter. in other [illegible] shut up the pores of the skin & the pipes of the hair lap. the hair receives more than [illegible] its superficies the pores are [illegible] [illegible] it meets pap. that the whiteness [illegible] animals [illegible] the common colour of their species. P. 397.

(158) after you have attentively looked upon the sun and your Eyes you still see a white, but in a [illegible] the white is changed into a [illegible] into [illegible] then into a green [illegible] green into a [illegible] into a violet & the violet into a [illegible] in which the area of the vibrations is abated.

Ink Invisible see Ink. — P: 403.

A winter People set over the Chimney a [illegible] of glass bottles full of water. upon the surface of the water they put the roots or Roots of Tulip, anemony, Jonquil, &c the heat of the fire is communicate to the water. the [illegible] particles of water penetrate the roots & Explicate them. you see the Roots [illegible] into the water, the shank ascend, & Flowers grow in the heart of winter. — vol 3d Pg.

Roots when they grow downward.

if a little plant be turned upside down [illegible] water yet it ought to descend & sink into the earth as it is the heaviest. its Scrap of roots gives it a direction downwards. [illegible] contrary the shank ought to ascend [illegible] if [illegible]

the Grafting.

When we [illegible]

Longitude

(13) [illegible] & stops the circulation, the circulation of the [illegible] being [illegible], there are plants which [illegible] [illegible]. [illegible] [illegible] the [illegible] [illegible] to the sensibility of the sensitive plant. — p. 42.

The Ensete is a Tree in Ethiopia whose leaves are so large that two of them are sufficient to cover a man behind & before. they lay rooms with them, they make use of them for carpets, for napkins &c. & the green of them is very fine. they grind the branches or thick ribs of the leaves, & reduce them into a very fine & white meal, which being eaten boiled with milk is delicious food; the trunk & roots are more nourishing than the branches. They cut the trunk into pieces like turnips & boil them with meat. oftentimes the wealthy themselves eat them by way of regale. — p. 44.

Plants maladies of them see Plants.

Scarlet. the grain of this proceeds from a kind of small round husk, covered with very fine down, being attached to the branches of the scarlet oak, in hot countries, upon the leaves near the prickles, & containing in the beginning the egg of a worm which at last becomes a small

[illegible] bursts out. a Turnout arises, & forms groups of [illegible] two feet diameter. the grass [illegible] of a years growth. P. 49

Steep in aqua vitae some seed, lettice, collflow, allatry: mix with Mould some white Sand & water into Paste with a little Spices during in twice 24 hours you shall have a lettice, Colliflower, salat. &c.

Would you have Parsley soak some Parsley seed in water & after having sown it in good Earth lay upon it plenty of the ashes of beans: after that sprinkle the Earth with spirit of wine & cover it well with Cloths. the Parsley will spring up in a small time.

If you design to raise peas & beans quickly without required but to put them in hot air for two days & nine days & then to sow them. the beans & peases will spring up in an Hour.

The Root of trees like the stomach of man receives the nourishment, digest, alter & change it into Radical juice. Accordingly one may observe, when ever the nourishment has passed from the root into the stalk that it takes a particular Flower Colour & Taste. the action of the air meliorates the juices in the trunk. the heat of the sun refines them there, to the application of their particles. &c.

Old Trees why they put out later see Trees.

Leaves : their use see Leaves.

Fruit How ripened see Fruit.

see Turnsole.

Plant how to preserve them. & inside Floors. see Plants.

In the Antilles, antego the Caribby Islands. Every thing shoots forth in the Winter the Fields there are hay covered with green. the reason is, in those Islands the winter is seven lost, in the summer the Plant are burnt up with Excessive heat. 8.65

Eggs how hatched. Chicken ovens in Egypt. see Eggs.

Between the Tropicks the vapours raised are so abundant & so high, that they fall again in rain the whole remainder of the night; which temperates the Excessive heat & renders these Countrys habitable notwithstanding the burning heat of the Sun. 8.93

Light as a sence the speeds thereof seem to proceed. see Lightning.

see Thunder.

Iris. Phenomena thereof Explained. see Rainbow.

[illegible] Atmosphere. see Moon.

Springs if the waters of springs have been filled in the Earth [illegible] beds of sand with small stones scarcely [illegible]

such as are found in the petrifying Fountain of Lorrain
in averane these little stones these little grains of
sand being sunk by the agitation of the water into
the pores of certain Bodies which encounter with them
penetrate the same without being able to get out again
the Bodies thereby become more weighty more solid &
more hard. some particles of different kinds being
carried off by the water in its passage over particular
strata will penetrate like small wedges. from hence proceed
the seeming mutation of wood into Stone, Iron & other
proper Bodies. if the Waters of Fountains have passed
through nitrous places they will in the sharpness of
corpuscles make the teeth fall out. nay they contain
corpuscles capable of having the force of the Bite of
Serpents, dissolving the blood & causing convulsions &
are pernicious. on the Contrary if they pass through
where they receive bituminous spirits they are
for dissipating obstructions & facilitating the Circulation
of the blood they are wholesome. the waters of
Spau in Germany & several other noted places. if they passing
oily places they are oily. if they carry off with them
Tons & Metals or fermenting Salts they are
the penetration. if they are oily above & hot they

[illegible] upper [illegible] again is that means [illegible] vast dimension of agitation which is the cause of heat. if they are held in the day time or hot at night the reason [illegible] the [illegible] separate the particles for much is lost in sensible agitation: whilst the [illegible] of the night detains [illegible] [illegible]. if in that [illegible] they encounter places full of sulphur or bitumen they should yield flame spirits. the volatile spirits rise & hover over the surface of the mountain which in some fell immediately into [illegible] fire. the causes of these meteors are so [illegible] to carriage. [illegible] p. 23.

Fiery Mineral ones may be divided into the three following heads

1st Sulphur or Brimstone as here [illegible] in Kent. near [illegible] Kearsborn & Farnborough in [illegible] & [illegible]

2d Salines or Cathartick as Epsom in Surry. Pyrmont in Germany Northall in Hertfordshire. these abound at St Paul [illegible] [illegible] quantities shine them upon evaporation.

3d Aluminous or alum as Bath in Somersetshire. Boatia in [illegible] [illegible] blown up with air by a Philosophers-centil [illegible] [illegible] the force [illegible] [illegible] power the [illegible] air & [illegible] in Equilibrio

[illegible] observed this upon his Breast.

because there is a regular proportion of [illegible] Breast
[illegible] & Breast in the Lark. as Mr. Ernac has
observed. the Gallis is a bird that is easily stopped. therefore
they can support an level of 600 Fathom upon their Breast without
any distress. then upon whomever this Gentleman is a person
[illegible] Lark [illegible]
to the strokes of a hammer, so that [illegible]
[illegible] an level of the number Sound [illegible]
strokes of a hammer which [illegible] of [illegible]
[illegible] other [illegible]
[illegible] so much as [illegible] the [illegible] the [illegible]
[illegible] only in proportion [illegible]
the level [illegible] the [illegible] has been
can [illegible] far. [illegible] suppose for example that [illegible]
[illegible] power of a [illegible]
[illegible] of [illegible]
the hammer is diffused into 2400 parts Every one of which
is equal to it. Dal: Phy: vol:2 P 20.

the atoms wherewith the Lymph is fully impregnated [illegible]
that the light was fainter [illegible]
[illegible] if the [illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Take a tincture of brasil good pliny in like warm water
filter & clarify it to a glass of which add a few drops of oyl
of vitriol turn it a fine ale colour

Secondly you put in stead thereof a little oyl of tartar it will turn
of them. it a claret colour into which a few drops of oyl of vitriol
dropped will change it a fine sack colour.

 for the beginning of this turn back to Page 96 §§. 138 (-11.)
upon the coming home of one of these Bees laden I have
seen above 10 or 12 Bees at work to discharge one single
Bee of the wax he has brought home & convey it to
others which were employd in building & framing the
Cells. Some Authors tell us that the Queen Bee which is
always larger than the rest is both mother & Queen
to the whole Colony & we find by Experience, that
where this governour is wanting the whole Hive
decays & comes to ruin. at Swarming time, Especially
3 or 4 Evenings before they are going out, the Queen
appears at the mouth of the Hive, & is guarded at that
time by 4 or 5 ranks of Bees, which stand before her in
straight lines fluttering their wings, & making a noise
without moving from their place, leaving room enough
between the ranks for the labouring bees to pass back
-wards & forewards. their swarming time is generally in
May. when they observe them Inclinable to fly away they
fling dust amongst them & if out of reach the firing
of a Pistol will make them settle Immediately. which
I think is reasonable Enough, Considering how much an
approaching storm makes them hasty to their Hives.
I suppose by pressing the air in an Extraordinary ma
such as the firing of a Gun or Pistol will do. for a rest
of their Robberies Battles burying their Dead &c Prefer to
the Accad: Mr. Thos. Hogan advertis for the year 1712.

Next to these we may place the Ichneumon flies, which have generally 4 transparent wings 6 legs, the body divided into 3 & joyned by tender vessels like the Bee's. Some of these lay

Ichneumon flies.

their Eggs in the Parenchymous part of leaves & fruit hence Oak berries & Oak apples; others in the Nymphe or Caterpillar of Insects, which has made some mistake the Aurelia of certain kinds of Butterflies, for the aurelia of Ichneumon flies.

Beetles

are a race of Insects whose first food is for the most part, the wood & Bark of Trees. Some of these have pinchers, like the horns of Bucks & stags, others have their Heads imitating the Rinoceros; others horns like Bulls & sometimes resembling the snout of an Elephant which makes us distinguish them by the names of, Bull Beetles Stag Beetles &c.

The Lady Cow

is of this Cated winged kind. this Insect very much resembles the Cochineel, a kind of Lady Cows wingeds have been often found in Cochineel, which his very probable is that Insect in its mature state. I had a present made me of some Cochineel

Cochineel.

found by one of the American slaves formerly employed by the Spaniards in that Trade) on the Indian fig in Carolina which proved to be full as good as that from the Spanish west Indies

The cockroach or brasho

have 6 legs apiece. their two hind ones are chiefly disposed for raising themselves till they can take wing. they have a chirping voice which is not remarkable in any Insect except the death watch & Cricket

I can give no account of their manner of generating or how they are brought forth, or proceed to their winged state. this abstract goes on at P. 59 in the letter **V.**